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MODEL AIRPLANE NEWS

GEORGE C. JOHNSON, Publisher — JAY P. CLEVELAND, General Manager

DECEMBER, 1945 — VOL. XXXIII, No. 6

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AN AIR AGE PUBLICATION

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THE NAVY'S FIRST jet-propelled plane, the Ryan FR-1 *Fireball* was first demonstrated publicly at the Naval Air Station Anacostia in Washington, D.C. The design answers a long standing question regarding use of jet propulsion for carrier based aircraft by employing a conventional reciprocating engine in the nose driving a propeller and a jet unit in the tail. Actually, both are used at all times and the characteristics of the two (being mutually opposed) blend into a single highly effective combination. The engine in the nose is a Wright *Cyclone* R-1820 nine cylinder, aircooled radial developing 1350 hp but capable of considerably more than this through the use of water injection. The jet engine is a General Electric model I-16 of an earlier production design and less powerful than the giant unit on the Lockheed P-80 *Shooting Star* (MODEL AIRPLANE NEWS, November, 1945 issue).

The combination of power plants was not selected at random but was rather the result of careful studies of Navy fighter plane tactical operation. The slow acceleration characteristics of the jet powered plane made the "pure jet" design impractical for carrier operation. The very fast acceleration of the engine-propeller combination made it a seeming necessity for the design. On the other end of the scale is the rapid falling off of power with an internal combustion engine and the rapid increase in power with a jet. The combination of the two

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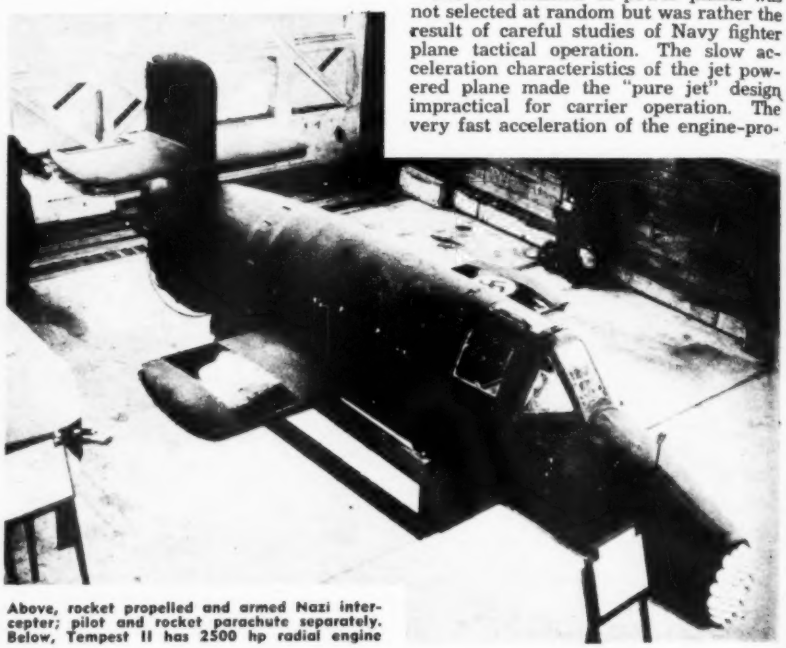

Above, rocket propelled and armed Nazi interceptor; pilot and rocket parachute separately. Below, Tempest II has 2500 hp radial engine

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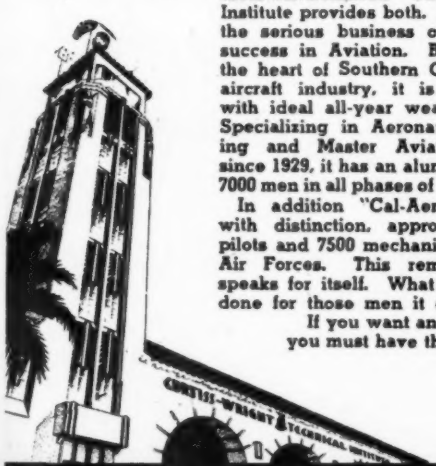

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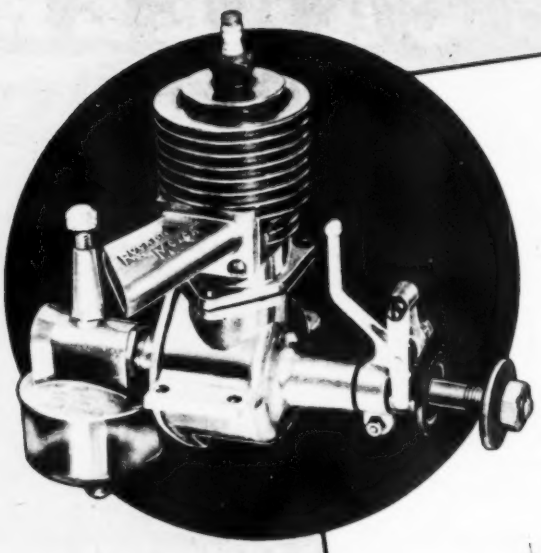

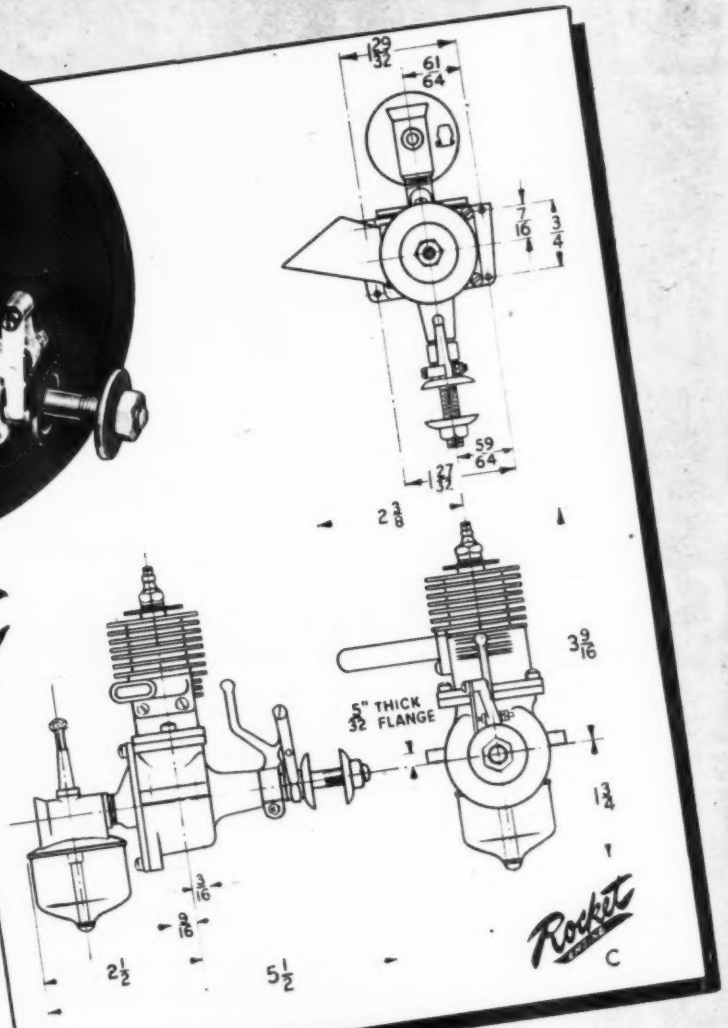

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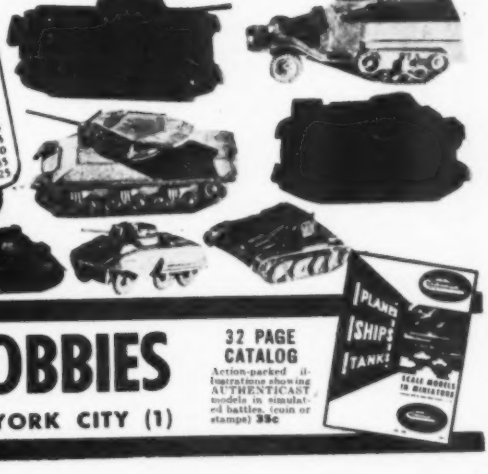

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Model Airplane NEWSLETTER

by AL LEWIS

WITH THE growth in activity that aeromodeling has shown in the past decade, it's about time we considered the historical aspect of our not-so-little hobby. Some sort of aeromodeling archives set up along the lines of the full scale library at the Institute of Aeronautical Sciences is what we have in mind.

This would be a natural and desirable function of the Academy of Model Aeronautics. The A.M.A. already has all the records which would be the most important part of such a library and permanent historical exhibit. In addition, a complete file of all model aviation books and publications would be available as part of the permanent collection for reference to those eligible to use the archives. Model manufacturers should be encouraged to file a copy of plans from all kits they put out to show the development of model building.

"Models" of outstanding models could be displayed. Craft such as Bassett's first gas job to clean up at a National Meet, the Wakefield winners, Goldberg's *Zipper*, and the old *K-G* would make a most interesting, informative and educational display.

Admittedly the assembly and upkeep of such a project would entail some expense, but granting that these can be met without too much difficulty the archives would be well worth their cost.

Here's a project for the Academy that's a natural.

* * *

Academy of Model Aeronautics license and club charter applications are being received in Washington in greater numbers than in the eleven year history of A.M.A. Looks like big times ahead for the contestant!

* * *

Diesels look like the next big step in "Gas" modeling. As far back as '35 we saw a successful Diesel job, but the designer just wasn't ready to produce it. Now one hears about Diesels from many fronts. Boleslas Degler, chief North African model aero representative for *Sports Aeriens*, the new official French sporting aviation organization, reports quite a few individuals are experimenting with model aircraft Diesel motors in France; production models should soon be announced.

From Italy, Cpl. John H. Wykes of the Engineers reports that Diesel jobs he has seen look most promising.

* * *

Hat's off dept.: One of model aviation's unsung heroes is a chap we'd like you all to meet—Everett N. Angus of Oaklyn, N.J.

Mr. Angus, a consulting engineer active in the textile and lumber industries, was the sparkplug behind the phenomenally successful South Jersey Gas Model Airplane Ass'n. At the time of Pearl Harbor, he was chairman of the A.M.A.'s important Rules Committee.

When it became apparent soon after we went into the war that certain high air warning service officials were about to clamp the lid on all gas modeling, Chairman Angus went to work in a hurry. In his efforts to keep a total ban from being slapped on powered flying, the Oaklyn Ball of Fire made several trips by air and

(*Turn to page* 12)

CLEVELAND MODELS ARE THE STANDARD OF THE MODEL BUILDING WORLD

GRUMMAN F6F "HELLCAT"

Designed by Fighter Pilots Themselves

THE "Hellcat" was properly named, for it has clawed from the sky everything the Japs could put up against it. The "Hellcat" sprung from the drawing board as a fighter designed by the fighter pilots who had fought the "Zero." It was developed from the experiences of the men who knew the answer to the "Zero." Used extensively in the South Pacific theatre proved itself by filling the skies with flaming enemy aircraft. Powered with a Pratt-Whitney Twin Wasp 18 cylinder, double row radial, air cooled engine, with a two stage super-charger, the "Hellcat" carries the greatest power plant ever put into a Navy fighter's nose—2,000 h.p. at high altitudes. Its battery of .50 caliber guns, self-sealing tanks, armor plate, and myriad of safety devices make it the most powerful plane in carrier service today. The Navy pilots say it's the most maneuverable plane in the world, and the deadliest ship ever sent against the Japs. The complete kit to build the C-D model of this world's most powerful carrier-based plane contains a great many parts of carefully selected materials. The accurately printed wood sheets contain all the needed parts that have been designed to fit exactly into place on the model. All strip wood is carefully selected, and is cut to the exact cross section for all fuselage stringers and wing and tail spars, selected wood blocks for all solid parts, and machined parts to construct a very realistic cowling, all parts to build a convincing looking motor, machined nose blocks, C-D type bearing button, slotted and drilled flying prop hub and die cut flying prop blades, material for scale prop, hard wood dowels for exact scale retractable landing gear, turned exact scale wheels, plenty of covering tissue, the famous C-D balsa cement and tissue cement, two large and two small bottles of colored dope, celluloid for cockpit, insignia sheets, and many other parts. C-D 31¼" Master Flying Model Kit SF-97..... **$3.50**

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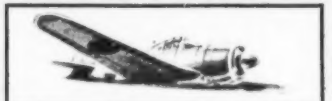
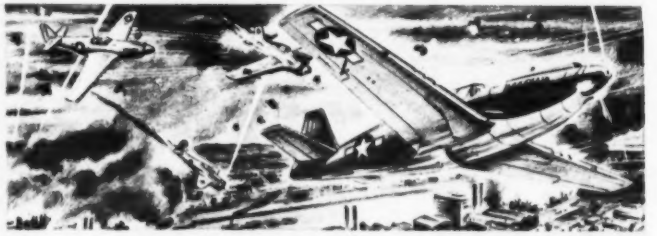


Japanese ZERO "00" 29¾". MFM Kit SF-86 ..... $3.00



Famed De Havilland "MOSQUITO"

World's fastest operational bomber. One of England's outstanding aeronautical achievements—an efficient weapon without parallel in performance and range. Classed as fighter-bomber-intruder; on bombing missions usually accompanied by "Mustangs." Span 40¾". C-D Master Kit SF-145 ..... $4.50

North American P-51 "MUSTANG"

Known as the tough, vicious "Flying Bronco." Pilots like its ease of control at top speed. One of the war's most versatile planes. Running beautiful interference for the "Mosquito" on bombing missions. Span 27-3/16". C-D Master Kit SF-91 ..... $3.00

Lockheed P-38 "LIGHTNING" 38¾". MFM Kit SF-85 ..... $4.00

Build These Big 3 Foot Models of Planes That Fought Over Europe!

36" Industrial Training Models for Learning Theory, Design, Construction, Flight

From top to bottom beginning at upper right: T85 Lockheed P-38 "Lightning", T78 Hawker "Hurricane", T99 Hawker "Typhoon", T74 Messerschmitt ME109, T77 Curtiss "Warhawk", T94 Piper "Cub", T75 British "Spitfire", T105 Westland "Whirlwind", T91 North American "Mustang", T155 Northrop P-61 "Black Widow", T76 Bell "Airacobra". Each Kit $1.50

Ask Your Dealer for Cleveland Kits . . . .

If he does not stock C-D or will not supply you send check or m.o. Add 20c for packing-postage per kit. No C.O.D.'s. Postal restrictions now prohibit shipments outside U.S. except to Canada and Mexico (to which 10% must be added). For service men still stationed in U.S.: Restrictions prevent our shipping to A.P.O. or Fleet P.O. Box numbers—so, use a local nearby address only! Special Delivery 25c extra (U.S. only). Ohio residents only add 3% sales tax. All Kit contents and prices subject to change or cancellation without notice. Minimum order $1.00.

DEALERS Order C-D Kits from your jobber. If he can't supply you, write us for name of nearest one who can.

CLEVELAND DESIGNED MODELS — CD — WORLD'S FINEST DESIGN QUALITY SINCE 1919

CATALOG 5¢ Free list at your dealers

CLEVELAND MODEL & SUPPLY CO., 4508E120 LORAIN AVE., CLEVELAND 2, OHIO, U. S. A. ★ **"World's Largest Manufacturers of Quality Model Aircraft—Since 1919"**

When You Build CLEVELAND MODELS *You're Building the Models that Pilots, Bombardiers, Instructors, Cadets-in-Training, and Men in All Branches of War Service Build!*

(*Continued from page 8*)

went right to the top to argue with national civilian defense and the Army officials.

He was finally told that if he could get the Academy to adopt some kind of self-imposed restrictions such as limited flight times, nothing would be done nationally toward barring gas flying, although local regulations as enacted by the various states or counties might still prove troublesome.

Limited flight time fitted in with the thinking of many leaders who foresaw engine manufacturing stopped by War Production Board orders and no replacements for engines flown out of sight.

As a result, the A.M.A. wartime flight limitation rules were promulgated amid varying reactions on the part of activity leaders and contest flyers. Reception was divided into two classes: those who wanted no restrictions, war or no war; and those who realized that conservation of existing engines was a feature of the new rules and, too, that the rules would appease overzealous civilian defense officials.

The wartime rules served their purpose and kept gas models aloft. When the danger of enemy aircraft over American home soil lessened, it was possible to relax restrictions. The rules were changed to conform with peacetime practice.

But during all the storm of controversy over flight limitations, Mr. Angus kept his tongue in cheek and did not violate confidences imposed upon him by high ranking officials who did not want to be quoted directly on the subject since they considered their actions, in permitting model gas flying to continue, a little too "lenient"!

So, belated recognition to the S.J.G.M. A.A.'s senior advisor. It was a tough assignment—he handled it well.

* * *

Are there any old Model Airplane Newsers in the audience? We mean readers who can remember 'way back to the early thirties.

If so, we know you'll agree with us that a tremendous change has taken place in the advertising found in this mag. As model companies grew they discovered, we assume, that a professional ad man could produce a better layout and better copy than the office boy.

This change is all for the better. We're sure 'most everybody skims through the ads as soon as they get hold of a new copy. Bet Editor McEntee wouldn't be caught dead admitting that, but as an old aeromodeling enthusiast he'll agree mentally.

One thing that's livened up the advertisements in addition to fancy layouts is the practice of giving eye-catching names to gas models. "Zombie", "Pacer", "Dreamer", "Buccaneer", "Playboy", "Spook", "Topper", "Rocketeer", "Tiger Shark" are a few of the many that come to mind.

But the real reason for this little dissertation is an idea we have had for recognizing outstanding ads—ads that present the facts without letting fancy sway the reader. Seems to us the Model Industry Ass'n. ought to present some sort of annual award for the best model aero ad and best consistent advertising.

One nomination we'd like to make is for those fine Ohlsson and Rice institutional ads that have been appearing on the back covers. To us they dignify the hobby as well as the industry and tell O & R's story as well!

MODEL BUILDERS! BUY FROM THE DEALER DISPLAYING THIS SEAL! He carries the newest and finest in models and model supplies.

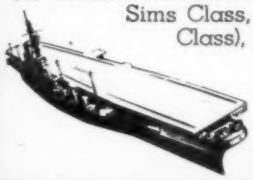
AUTHORIZED DEALER
PAUL
APPROVED MODELS

B. A. R. GUN

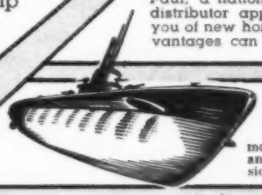
This is the famous Anti-aircraft Rocket Gun, Britain's answer to the Robot Bomb! This new kit, containing hundreds of perfectly prefabricated and pre-formed all-metal parts, is the first of the post-war all-metal super kits. Complete with all materials, tools, instructions, plans, and hardware necessary to complete this outstanding model. **$5.95** postpaid.

COMET'S PRECISION SHIP MODEL KITS

Now you can own these minutely-detailed models of the fighting ships of our Navy! Every part and fitting needed is furnished: precision-shaped hull, metal gun turrets, anti-aircraft guns, etc. Everything for finishing is also included: file, steel wool, etc. No parts for you to make; no special tools to buy. Full-size plans included. Elco PT Kit, **$11;** Battleship NC Class, **$11;** Battleship Iowa Class, **$11;** Aircraft Carrier Enterprise, **$11;** Cruiser Baltimore Class, **$9;** Cruiser Cleveland Class, **$9;** Destroyer Sims Class, **$6;** DE-51 (Buckley Class), **$6.** All postpaid.



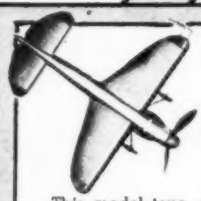
MODEL DEALER, you are interested in getting as many "plus values" as possible. We, as model distributors, are striving to merit your patronage by offering you as many extra advantages as we can. Here are a few: The country's largest single merchandise source; 48-hour service in shipping your order; a long list of exclusive models, available only through B. Paul; a national advertising policy which we feel no other distributor approaches; daily direct-mail notices, informing you of new hobby items available. These and many more advantages can be yours. Write us for complete information.



VARNEY PLASTIC SUBMARINE

For detailed construction and ease in assembling, this new sub is unsurpassed. It's made entirely of molded plastic and is supported by a streamline base and a section of glass, making it appear to be in suspension. All parts fit together by means of cast lugs and molded holes or into indicated positions. The result: The finest submarine model available. **$5.00** postpaid.

Varney PT Boat.....**$7.95** postpaid



TOPPING'S "100" U-CONTROL FLYER

This model tops em all! No wonder! The entire plane is made of pre-formed aluminum, with tough plastic wing and tail tips color-matched with Topping's three-blade plastic propeller and spinner unit. All you do is install your motor and wiring, snap together the fuselage, wing, and tail assembly, and she's ready to fly! Vertical-split fuselage. For B or C motors. Light in weight. Complete with detailed instructions. **$10.00** postpaid.

P-61 BLACK WIDOW

Here's the finest solid model kit you can find! Detailed cast landing gears, propellers and motors. Tapered wings. DeLuxe construction throughout. Complete plans included. **$3.95** plus 35c parcel post.

WEST-CRAFT SUPER SCOUT CAR

Here's a new, perfectly scaled model that's fun to build and a thrill to own! Wood parts, with plenty of plastic, decal and fibreboard units for making an unusually authentic model. Complete instructions included. **$2.50** plus 25c parcel post.

DREAMER WITH FLIGHT-CONTROLLER

This sensational model is a thriller for speed, sport and precision flying. Perfect finger-tip control. 19" wingspan. For A, B or C motors. Cut-to-size rudders and stabilizers. 2½" streamline wheels. All parts printed on balsa. Plans included. **$7.50** postpaid.

VAGABOND

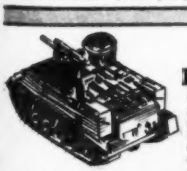
Here's the perfect model for endurance contests! Designed for Class C motors. 74" wingspan. All parts printed on balsa. Formed landing gear. 3½" streamlite wheels. Plans included. **$5.50** postpaid. less motor.

TARPON

Here's control-line perfection! Completely finished redi-hollowed two-piece fuselage requires sanding only. For B or C motors. Has reached speeds up to 120 M.P.H. **$10.95** postpaid.

MEGOW'S WOG

The latest in free-flight gas models . . . combines all the principles necessary for speedy ascent and long spiral glides without loops, spins or smashing power dives. Wingspan 60 inches. For Class B motors. Complete, less liquids and power unit, **$4.98** plus postage.

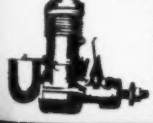


COMET METAL TANKS

These are detailed replicas of official Army models. Cast in metal from original models, they contain every detail including rivet heads, gas tank covers, undercuts! ALL models feature revolving turrets!

U. S. M7 105 Howitzer **$1.75;** Ger. Med. PZKW, 111 **$1.50;** U. S. M18 Tank Destroyer **$1.35;** British Churchill MK VII **$1.50.** Plus 15c parcel post on each.

All shipments are insured against loss if you use Money Orders. Do not send cash. On orders under $1 add 20% for parcel post; $1 to $5 add 10%; over $5 postpaid (except where otherwise stated.)

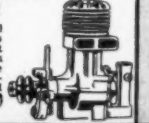


VIVELL "35"

This small Class C motor is capable of flying Class C or large Class B flight planes. 1-5 horsepower. All motors tested and guaranteed to run. Postpaid, less coil and condenser.....**$10.00**

ATWOOD CHAMPION MOTOR

In performance and dependability this motor is the finest power plant you can buy! Complete with coil, condenser, and metal fuel tank. Postpaid **$23.50**

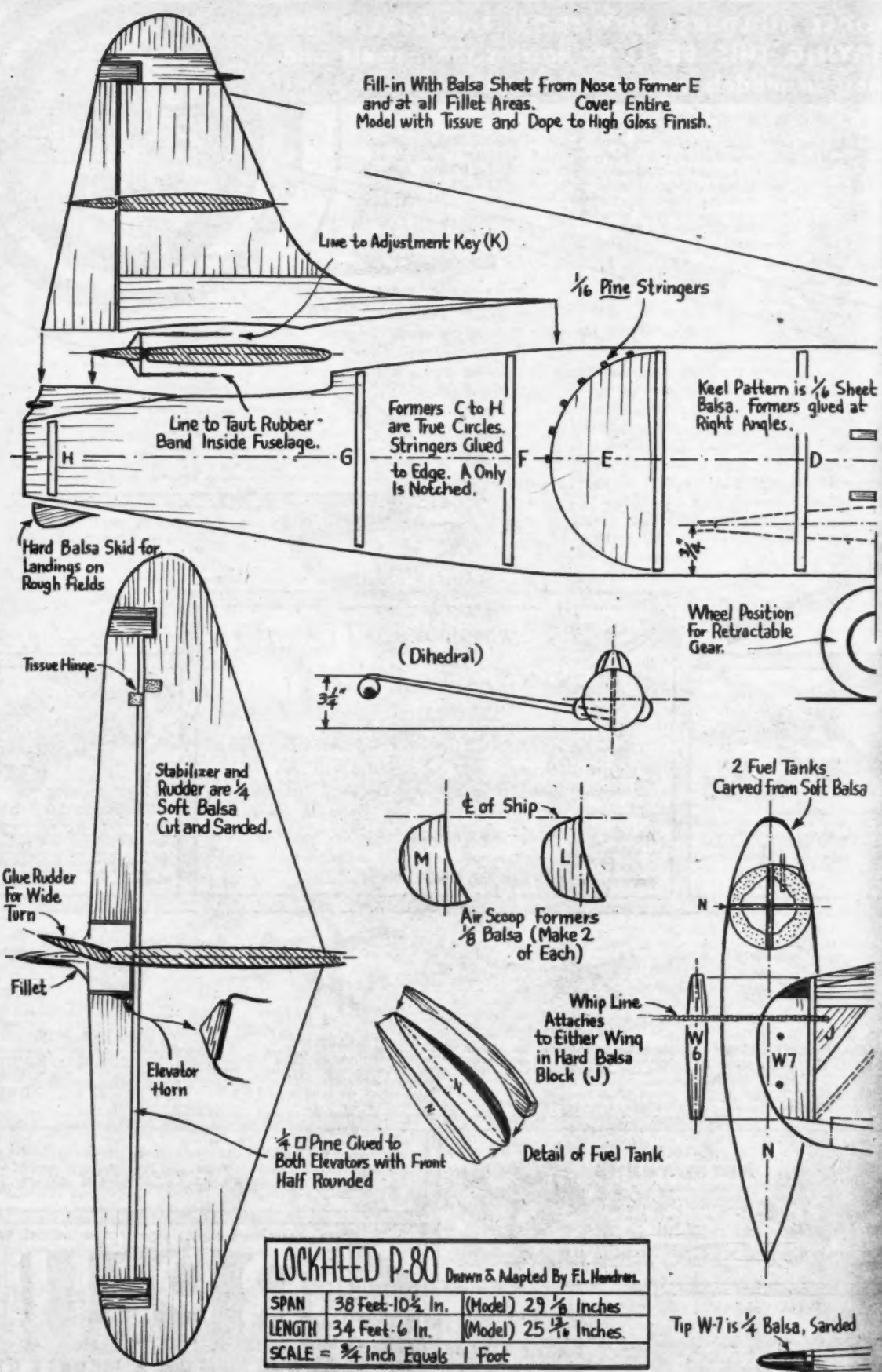


AMERICA'S GREAT HOBBY AND MODEL FAIR

B. PAUL

N. E. COR. 6TH & MARKET STS

DEPT. M-12 Philadelphia 6, Pa.



LOCKHEED P-80	Drawn & Adapted By F.L. Hendren.	
SPAN	38 Feet-10½ In.	(Model) 29 1/8 Inches
LENGTH	34 Feet-6 In.	(Model) 25 17/16 Inches.
SCALE = 3/4 Inch Equals 1 Foot		

LOCKHEED P-80

No propeller mars this whip control model but it will give you thrilling performance nonetheless

by F. L. HENDREN

WE'LL bet there's hardly a model fan living who hasn't cast an admiring eye on the beautiful streamlining of Lockheed's new P-80 in the recently released pictures that have been appearing widely. Very aptly named the *Shooting Star*, this fastest of all jet propelled fighters actually looks the part. Its design shows power with a purpose—and the whole thing is combined with some of the sleekest lines ever to come off an engineer's drawing board. When the P-80's designer, C. L. "Kelly" Johnson, found himself toying with speeds of what the Army calls "well over 500 mph" he came upon that rare occurrence where hardheaded engineering gets together with art—and the result is definitely a thing of beauty.

Quite naturally, the model fan's first reaction is to want a model P-80. And since a lot of us like to see our ships sailing around in the sky instead of gracing a shelf the matter of power for a *Shooting Star* presents something of an obstacle. Model jet propulsion is definitely on its way, but as it isn't here yet for the majority of model builders the answer can be "Swing Control" as discussed in previous issues of M.A.N. Simply, we can let centrifugal force provide the power by fastening the ship to a control or whip line and swinging in a large circle.

With this simple and mighty interesting flying technique, and a model such as we have suggested here, you won't have to wait to see a real P-80 on the wing. You can put one up over your own backyard or the neighbor's vacant lot and have the fun of listening to it whistle around in the sky as you actually fly it yourself.

Basically, a flying model of this ship is simple. Like all models, the more time, care and patience you give it the more beautiful will be the result. The accompanying condensed plan shows the fundamental construction and patterns necessary in building a ¾" to 1' scale model. The one we built flew well and fast, landing handily on a smooth strip; however we believe a ship built on about a 1" to 1' scale would do even better—and whistle even louder.

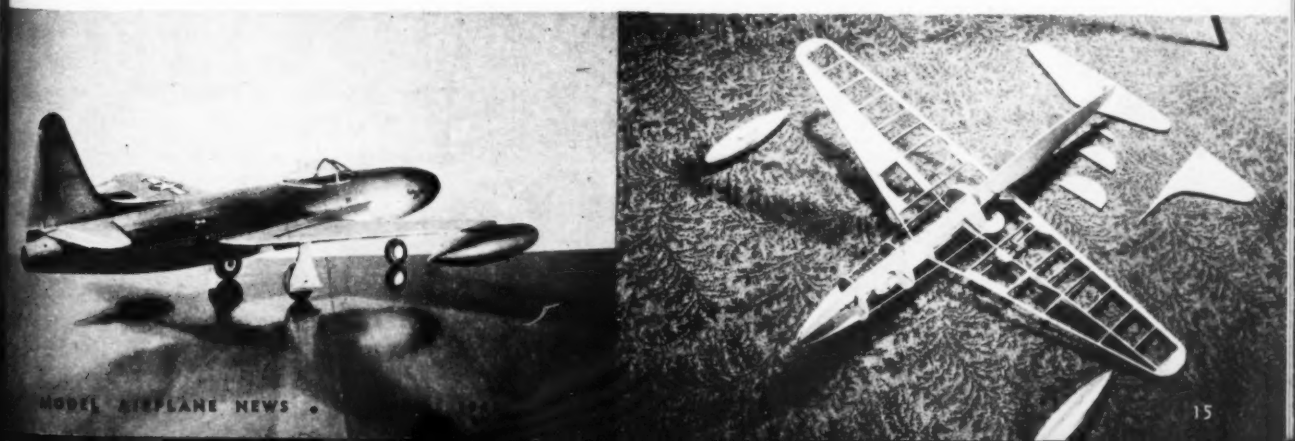
The first step in construction is to either scale up the drawing shown here or have a photostat enlargement made of the various parts. Next, lay in a supply of medium and soft balsa sheets in a variety of thicknesses ranging from 1/32" to 1/4" —and you'll need some blocks of soft light balsa for filleting and forming the nose as well as the two wing fuel tanks.

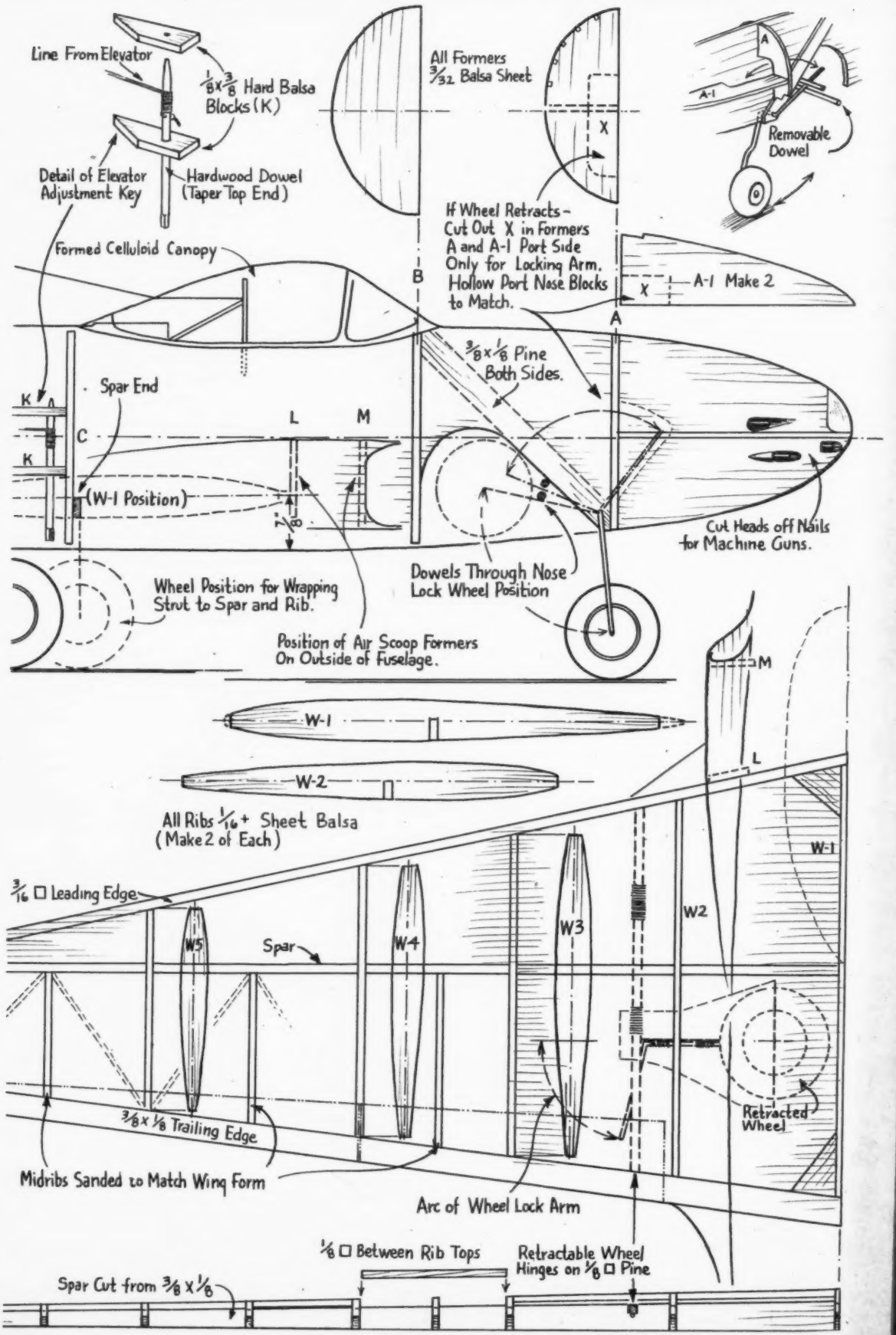
As beautifully streamlined as the *Shooting Star* is, we just couldn't help making the wheels retractable, hence a method is suggested in the plan. However, it does take more time and necessitates extra strengthening, not to mention some careful detail work on wheel well covers. But it adds speed and maneuverability that will make your model literally flash in circles above you. (For details on remote controlled retraction refer to M.A.N., June 1945). Study the plan carefully before beginning and decide on permanent or retractable wheels before you begin building.

Start with the tail surfaces, cutting patterns from 1/4" soft balsa sheet and gluing as indicated. Watch the direction of grain, fitting at right angles for additional strength. Make both stabilizer and vertical fin in complete units, carve and sand to shape—then carefully cut rudder and elevators free. Glue both elevators to a pine shaft, rounded where it meets the stabilizer; a horn is affixed with lines glued in and long enough to reach the nose of the ship. Hinge with double tissue, doped on.

Next comes the fuselage, cutting a silhouette form out of 1/16 soft straight balsa. The nose wheel pocket is also cut

(*Turn to page* 70)




Line From Elevator
1/8 x 3/8 Hard Balsa Blocks (K)
Detail of Elevator Adjustment Key
Hardwood Dowel (Taper Top End)
All Formers 3/32 Balsa Sheet
X
If Wheel Retracts - Cut Out X in Formers A and A-1 Port Side Only for Locking Arm. Hollow Port Nose Blocks to Match.
A
A-1
Removable Dowel
Formed Celluloid Canopy
B
A-1 Make 2
3/8 x 1/8 Pine Both Sides.
K
A
Spar End
C
K
L
M
(W-1 Position)
7/8"
Cut Heads off Nails for Machine Guns.
Wheel Position for Wrapping Strut to Spar and Rib.
Dowels Through Nose Lock Wheel Position
Position of Air Scoop Formers On Outside of Fuselage.
M
W-1
W-2
L
All Ribs 1/16 + Sheet Balsa (Make 2 of Each)
W-1
3/16 □ Leading Edge
W5
Spar
W4
W3
W2
Retracted Wheel
3/8 x 1/8 Trailing Edge
Midribs Sanded to Match Wing Form
Arc of Wheel Lock Arm
1/8 □ Between Rib Tops
Retractable Wheel Hinges on 1/8 □ Pine
Spar Cut from 3/8 x 1/8

by ROBERT C. HARE

WORLD WAR I

Fig. 1. The unusual quadrupod tail skid support is clearly evident here

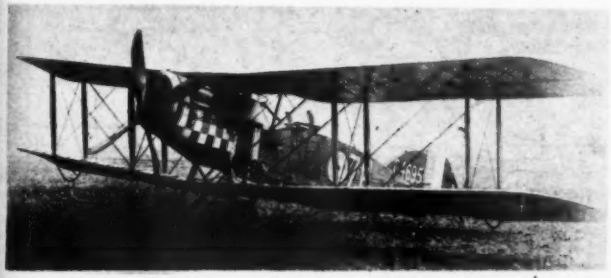


Fig. 2. This Bristol F2-B is fitted with a Rolls-Royce "Falcon II" engine of 280 hp

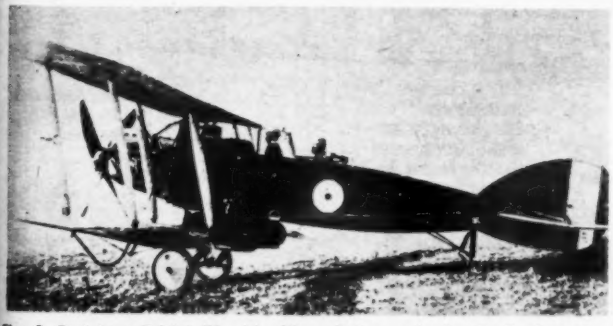


Fig. 3. Prototype Bristol F2 with side radiators and wing to fuselage fins

Fig. 4. Notice the huge propeller and small ground clearance on this F2B

NO MATTER how well an airplane is designed from aerodynamic and utility points of view, its success in the final analysis depends first upon its excellence of construction and second on the skill of its pilots. It goes without saying that a pilot's individual skill is brought out to the fullest degree only when he has complete confidence in his machine.

That perhaps explains why the Bristol F2-B was such an outstanding success on all fronts and in every role it was required to play. Ample evidence of the statement that the Bristol F2-B was a "pilot's plane" is found in the Air Ministry's files containing requests by single seater pilots for transfer into units flying the *Brisfit*.

In the middle of 1917, when the S.E.5 began to replace the earlier Sopwith *Camels*, the Bristol Fighter also came into the picture in numbers. While the S.E.5's were being sent out as replacements, the F2-B's were going into action as an entirely new tactical type. It didn't take long for stories about the F2-B's fighting ability to get around, and requests to join the Bristol squadrons then being formed threatened to depopulate single seater fighter squadrons. It was necessary for R. F. C. authorities to put a stop to transfers, unless a fighter C. O. specifically recommended transfer of a man who hadn't done too well on single seaters. There was nothing wrong with this procedure because Bristol Fighter personnel had to be trained to the new airplane. Training methods stressed the remarkable features of the airplane itself, and equally important the pilot-observer teamwork necessary to obtain the greatest possible effect.

Training for both pilots and observers began with a ride in the F2-B during which the instructor literally turned the ship inside out. Students were soon to learn that the F2-B was one of the strongest aircraft turned out by any nation. Following that first flight, most students were immediate converts and entered subsequent stages of training with vigor and enthusiasm.

Bristol Fighter Construction

Last month, design characteristics of the Bristol F2 series were discussed, in which it was shown that the *Brisfit* configurations were the result of planning to fulfill a specific function—fighting. Yet the simplicity of construction with which the airplane was endowed proves its designer, Captain Barnwell, was production minded as well.

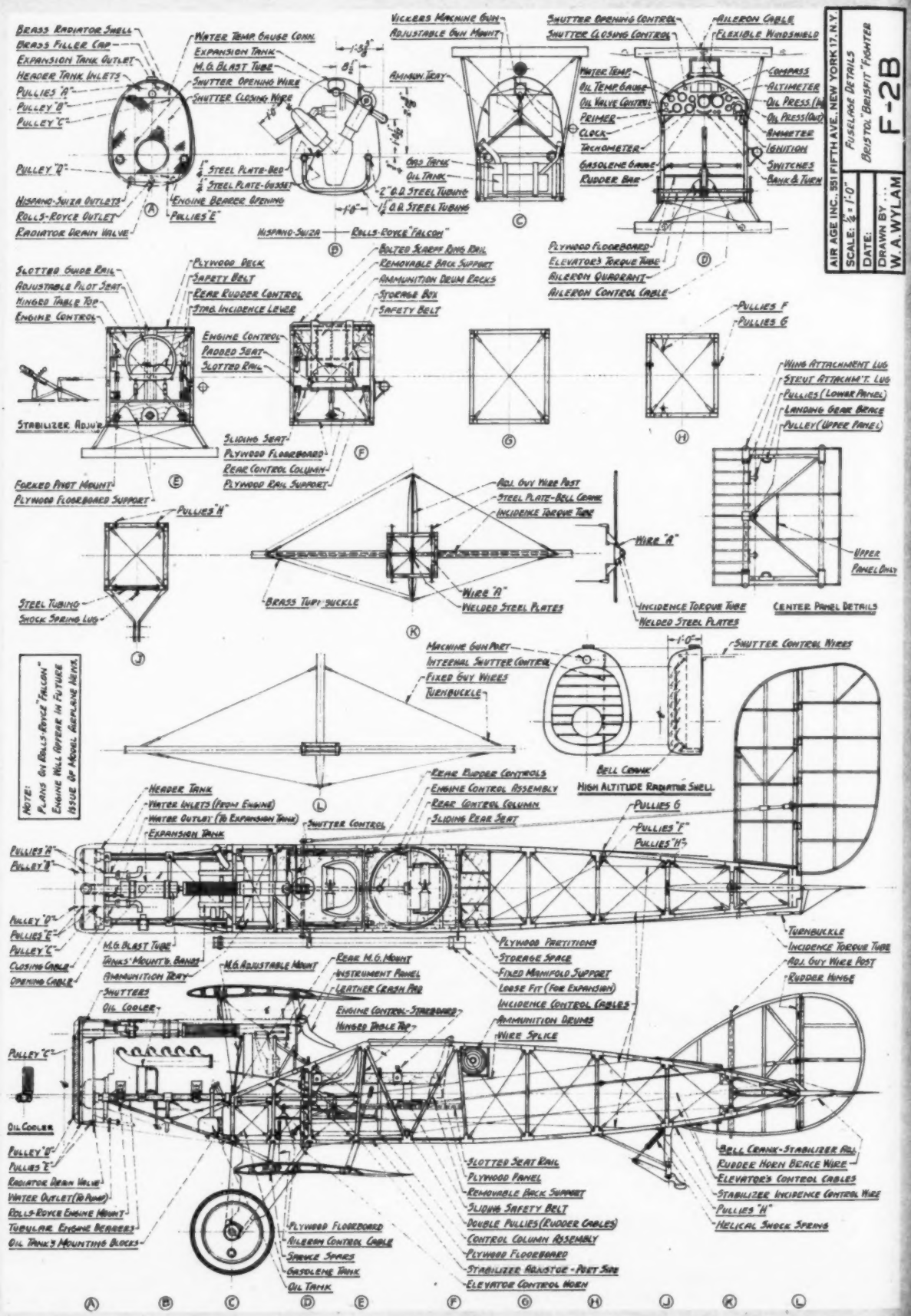
The fuselage proper was composed of four spruce longerons connected by vertical and horizontal cross braces, assembled in jigs and joined by means of stamped steel fittings. The fuselage was symmetrical in plan and elevation. Steel wires turnbuckled to the steel fittings were tensioned to provide a rigid structure. A simple steel tube engine mount was bolted to the first upright of the fuselage proper which also formed anchorage for the terneplate firewall. In side elevation, the engine bearer tube was a continuation of the fuselage plane of symmetry.

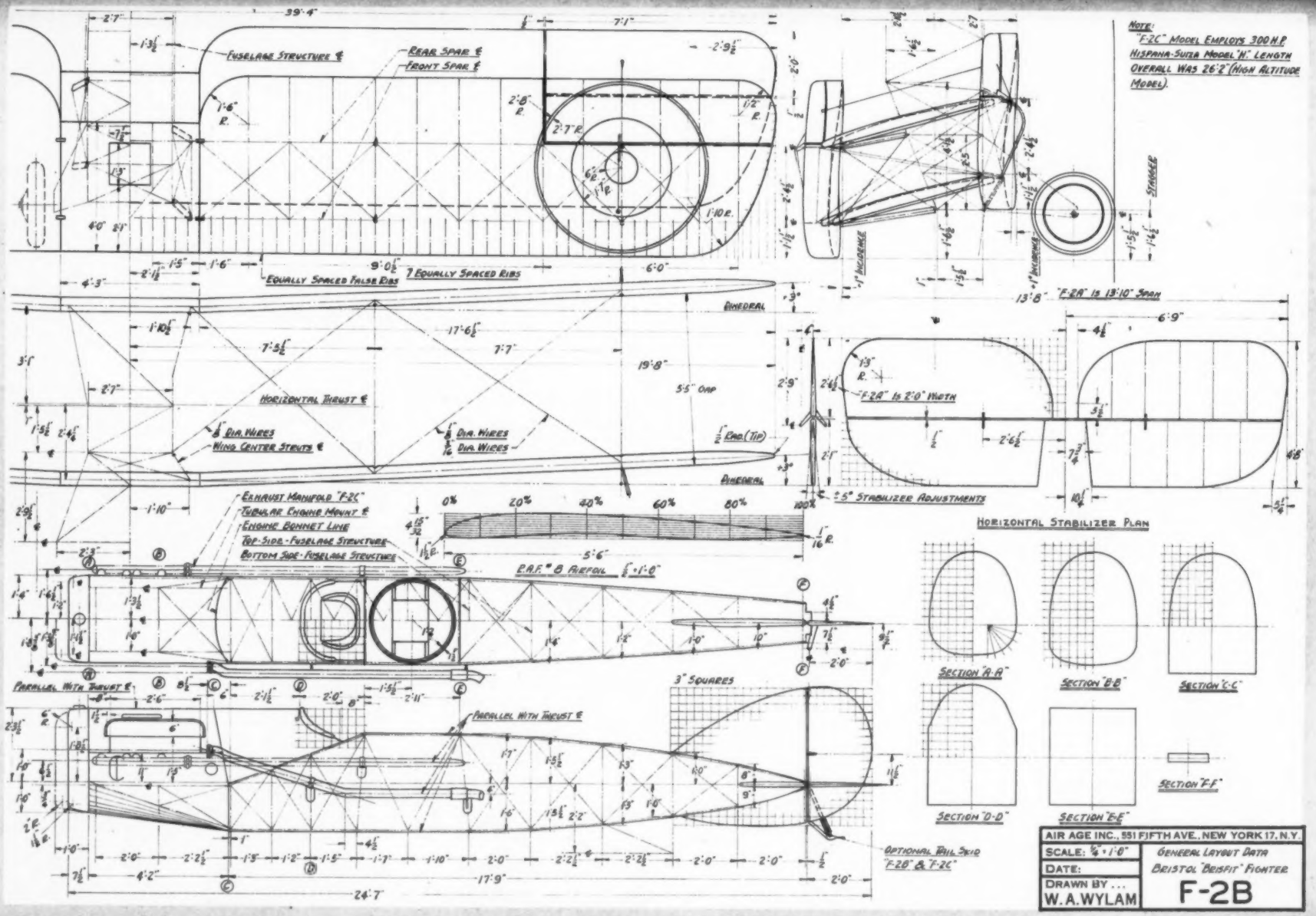
Plywood floorboards for both pilot and observer were attached to the lower longerons. The pilot's seat was adjustable and mounted on rails on either side of the fuselage interior. Observer's seat was

(*Turn to page* 58)

PART 2

These complete the 4 pag



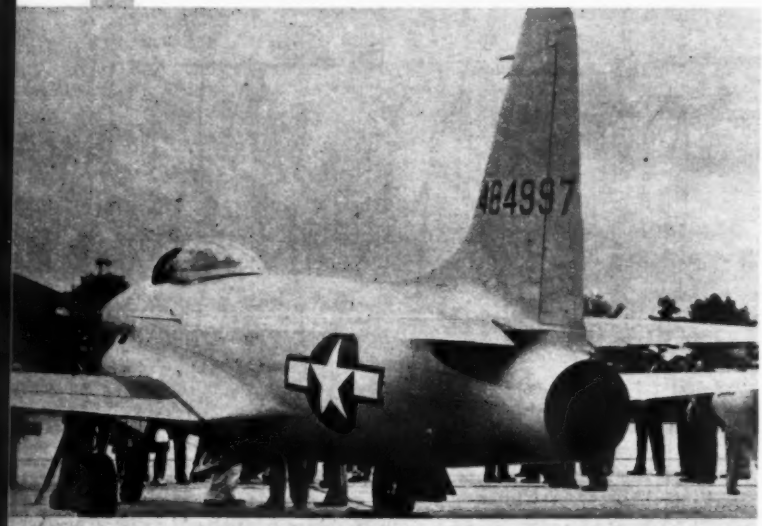


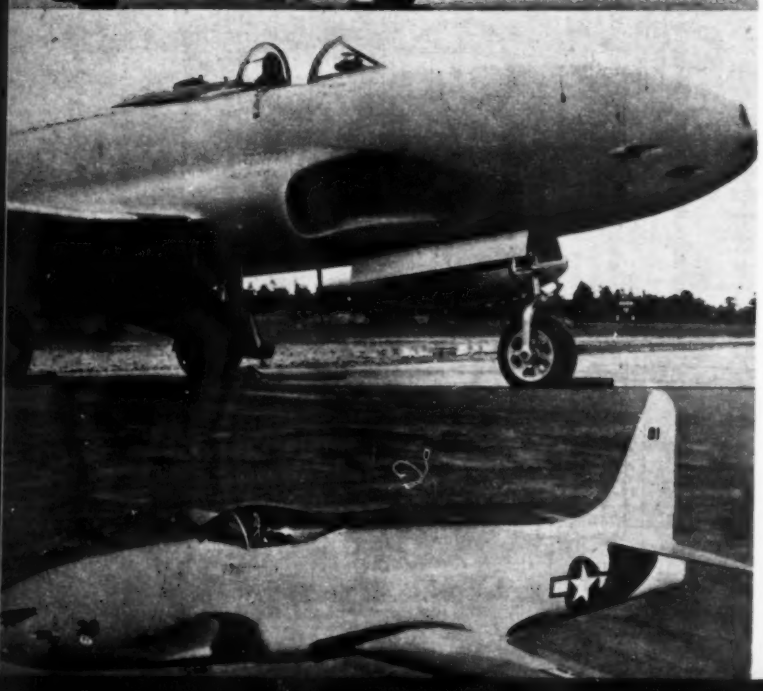
AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.	
SCALE: 3/4" = 1'-0"	General Layout Data
DATE:	Bristol "Bristfit" Fighter
DRAWN BY ... W.A.WYLAM	F-2B

P-80

by ROBERT McLARREN

Full details of one of the most beautifully streamlined planes to come out of the war





DAYTON to New York in one hour, two minutes! Dayton to Washington, D.C., in one hour, one minute! Persistent rumors of a Burbank to Washington flight of 3 hours 30 minutes; of a Burbank to Chicago flight of 2 hours 20 minutes! That is a mad dream of the Twentieth Century brought to life today in the tangible, gleaming white wings of a man-made spectre: the Lockheed P-80 *Shooting Star*, fastest airplane in all the history of flying.

Looking for all the world like a subterranean manta ray whistling across the stratosphere, the appearance, mechanism and performance of this fantastic creation is, to the layman, a topsy-turvy mixture of dream and reality. But to the engineer it is a bold, scientific accomplishment of somewhat breathtaking possibilities.

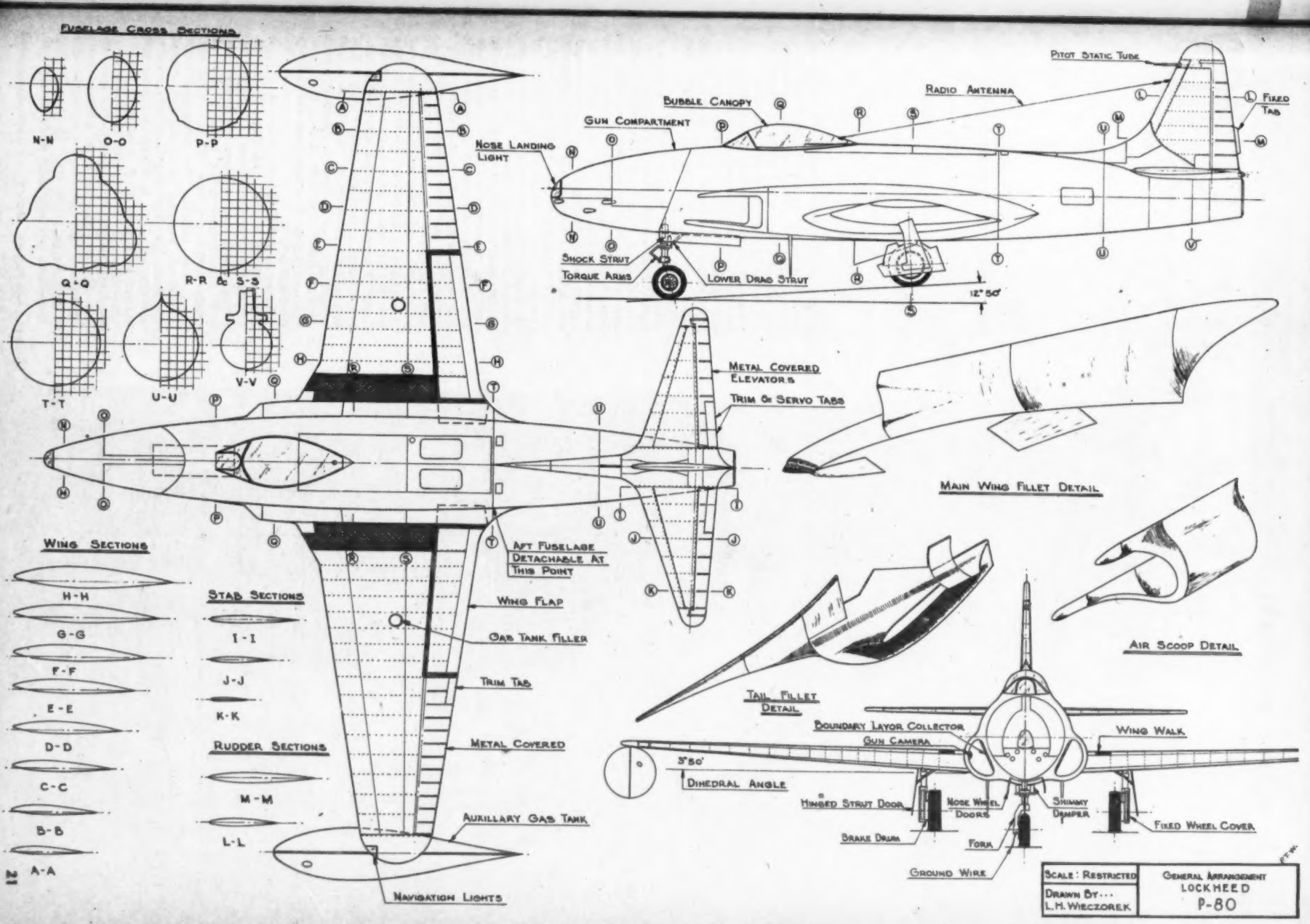
Moreover, its conception, from idea to completed article in the unbelievable time of 143 days, lends more credence to those who swear it was a modern Merlin's magical concoction. But the *Shooting Star* is more than glamour aloft: it is a hard, practical fighter plane designed not to startle innocents below but to accomplish a fundamental combat mission: the destruction of hostile aircraft aloft. From nose to tail it is a fighting ship and all of its weird curves and strange contours have been fashioned for utility, not for fame. It is a single seat, single engine fighter plane different from its predecessors only in details and performance.

It is not a large ship, for its span of less than 39' makes it smaller than a *Thunderbolt* and its weight of 7 tons is considerably less than that of a CG-13A glider. But its powerplant is new, its aerodynamic layout an innovation and its performance surpasses anything heretofore conceived.

It is powered by a General Electric gas turbine unit slightly larger and considerably more powerful than earlier modifications of the original Whittle jet engine. The engine is located within the fuselage at approximately the midpoint with the nose and tail tapering away from this thickest portion. With this concentration of weight, the wing is located directly below the jet unit and much farther aft than on conventional designs. The unit actually has but one moving part, a shaft with an impeller on its forward end and a turbine on its aft end. This unit turns at speeds in excess of 10,000 rpm, more than three times the speed of the conventional reciprocating engine.

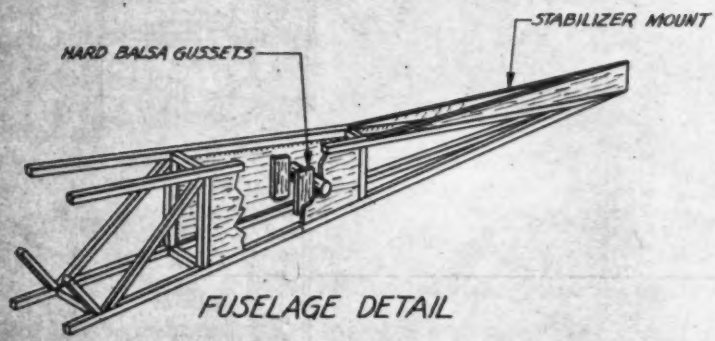
(Turn to page 75)

FUSELAGE CROSS SECTIONS

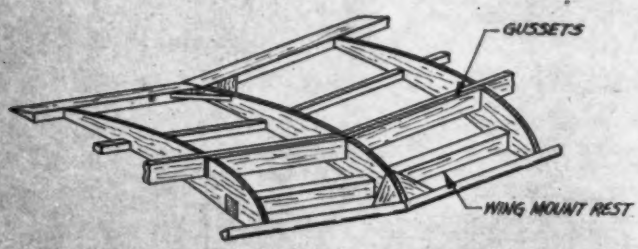

FUSELAGE CROSS SECTIONS
N-N
O-O
P-P
Q-Q
R-R & S-S
T-T
U-U
V-V
WING SECTIONS
H-H
G-G
F-F
E-E
D-D
C-C
B-B
A-A
STAB SECTIONS
I-I
J-J
K-K
RUDDER SECTIONS
M-M
L-L
NOSE LANDING LIGHT
GUN COMPARTMENT
BUBBLE CANOPY
PITOT STATIC TUBE
RADIO ANTENNA
FIXED TAB
SHOCK STRUT
TORQUE ARMS
LOWER DRAG STRUT
12° 50'
METAL COVERED ELEVATORS
TRIM & SERVO TABS
AFT FUSELAGE DETACHABLE AT THIS POINT
WING FLAP
GAS TANK FILLER
TRIM TAB
METAL COVERED
AUXILLARY GAS TANK
NAVIGATION LIGHTS
MAIN WING FILLET DETAIL
AIR SCOOP DETAIL
TAIL FILLET DETAIL
BOUNDARY LAYOR COLLECTOR
GUN CAMERA
WING WALK
5° 50'
DIHEDRAL ANGLE
HINGED STRUT DOOR
NOSE WHEEL DOORS
SHIMMY DAMPER
FIXED WHEEL COVER
BRAKE DRUM
FORK
GROUND WIRE
SCALE : RESTRICTED
DRAWN BY... L.H. WIECZOREK
GENERAL ARRANGEMENT
LOCKHEED
P-80

by GEORGE McLAFFERTY

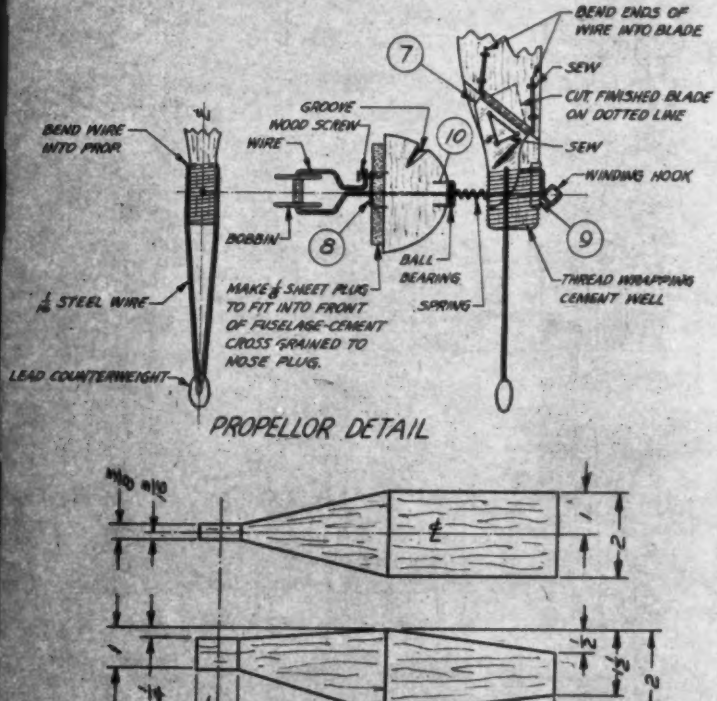
SENIOR



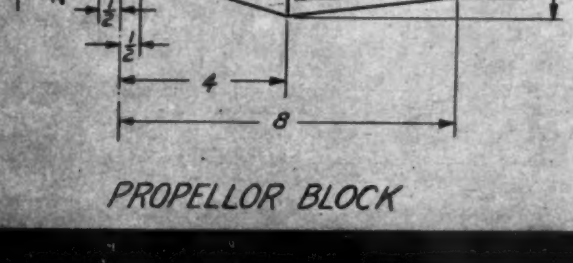
FUSELAGE DETAIL



WING CENTER SECTION



PROPELLOR DETAIL



PROPELLOR BLOCK

SOME call it skill, others call it luck, but there is a lot of both involved in setting a National Record. The particular record we are talking about is the flight of 16 min. 47 sec. made by the model pictured here.

Various modifications of the same model have been winning contests for the past several years. This particular version seemed to fly better than any of its predecessors and in its first major contest proved this point completely.

The flight took place just after noon, at a contest sponsored by the *Linden Model Airplane Club* at their home field. The model flew into a rising air current just after the prop folded. The thermal took it up to around a thousand feet and kept it there for a good part of the flight. Luckily, it was not the kind of thermal that turns a model builder into a cross-country runner; if it had been the model would have gone out of sight in four or five minutes. As it was, I was able to lie down in the grass for over five minutes just watching the model circle lazily overhead. That couldn't last forever however and the model started drifting away, but it was slow enough so that an ordinary walking pace was sufficient to keep up with it.

At the rate it was going it would fly forever, but luckily there was a downdraft that grounded it a mile from the field. It hit a tree and fell into a creek but no damage was done. The complete flight was over 21 min. but it went out of the timer's sight in 16 min. 47 sec. However, it proved a consistent winner by taking first in another contest several weeks later with a time of 2:24 on only one flight. The low time was due to a cold windy day.

Every model builder's dream is a plane that will set records like this one, but the average builder finds from experience that it can't always be done because no one plane is so far superior to all others that it can outfly them every time. Therefore we don't claim that building this particular model guarantees winning every contest entered. Workmanship, the propeller, adjustments, and most of all the luck involved in catching thermals all contribute toward a model's ultimate success. However, if you construct this ship accurately and adjust it correctly, you will have as good if not a better chance of winning that next contest as anyone else.

CONSTRUCTION—The ship was built from balsa whose quality was not very high;

R CLASS D STICK MODEL

Classed as a stick model this flier with its slender enclosed fuselage and folding propeller has produced many exceptional flights

for this reason, and because the model was meant to last as long as possible, the construction was extra heavy yet extremely durable.

The model weighs 7½ ounces complete, which is nearly two ounces over the weight rules. If pine were substituted for balsa the weight could probably be cut down rather than increased. Therefore don't hesitate to build this ship if you haven't any balsa. Substitute pine and you will get just as good results.

The first step is to scale up the plans. Most of the parts are drawn half scale so it is an easy matter to double the sizes with a pair of dividers or with a ruler. Patterns for the ribs, wing tip parts and rudder, however, are full sized and need only be traced or cut out.

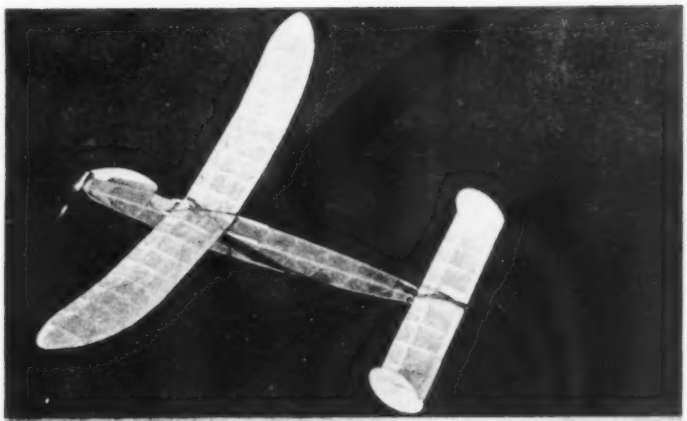
BODY—Instead of the regular cross brace type construction, the Warren Truss type is used on the sides of the body. This is not only stronger because it distributes the stresses more evenly but also because it gives more glueing surface on the cross members whose ends are cut diagonally.

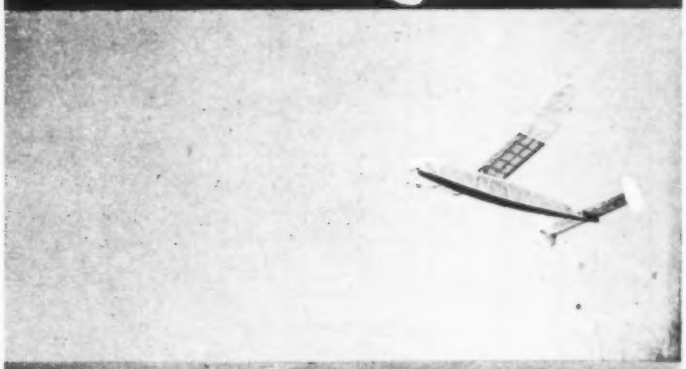
Lay the longerons, which are oversized ⅛ square, on the plan and glue the two cross braces in at the nose. Then fit in the diagonals, one at a time, going from nose to tail. Build the second side of the body on top of the first, to make sure they are identical. When dry, take them from the plan, glue the tail together and then glue the cross braces in the nose. Next glue in cross braces 1¾" long under the middle of the wing mount and some ⅞" long in front of the section in which the rear peg is located. Fill in the rest of the cross braces letting the body stay in the natural curve formed by glueing in these key supports.

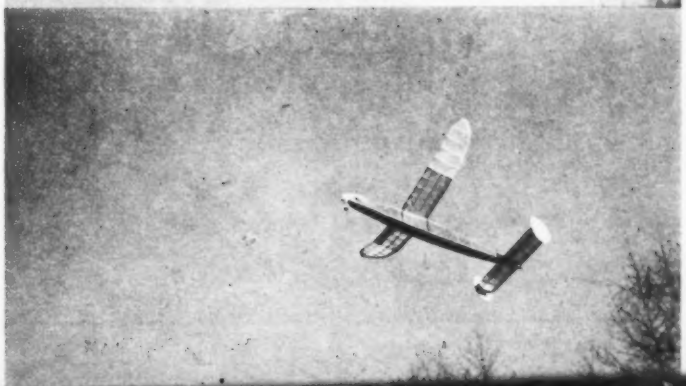
When this is done, fill in the nose sections and those around the rear motor peg with ⅛" sheet. Cut the stabilizer mounts from ⅛" sheet and glue them in place. Do not put the wing runners on until the model is covered. Drill a 3/16" hole for the peg which holds the rubber in the rear and brace the inside of it with a strip of hard balsa glued just in front of the hole.

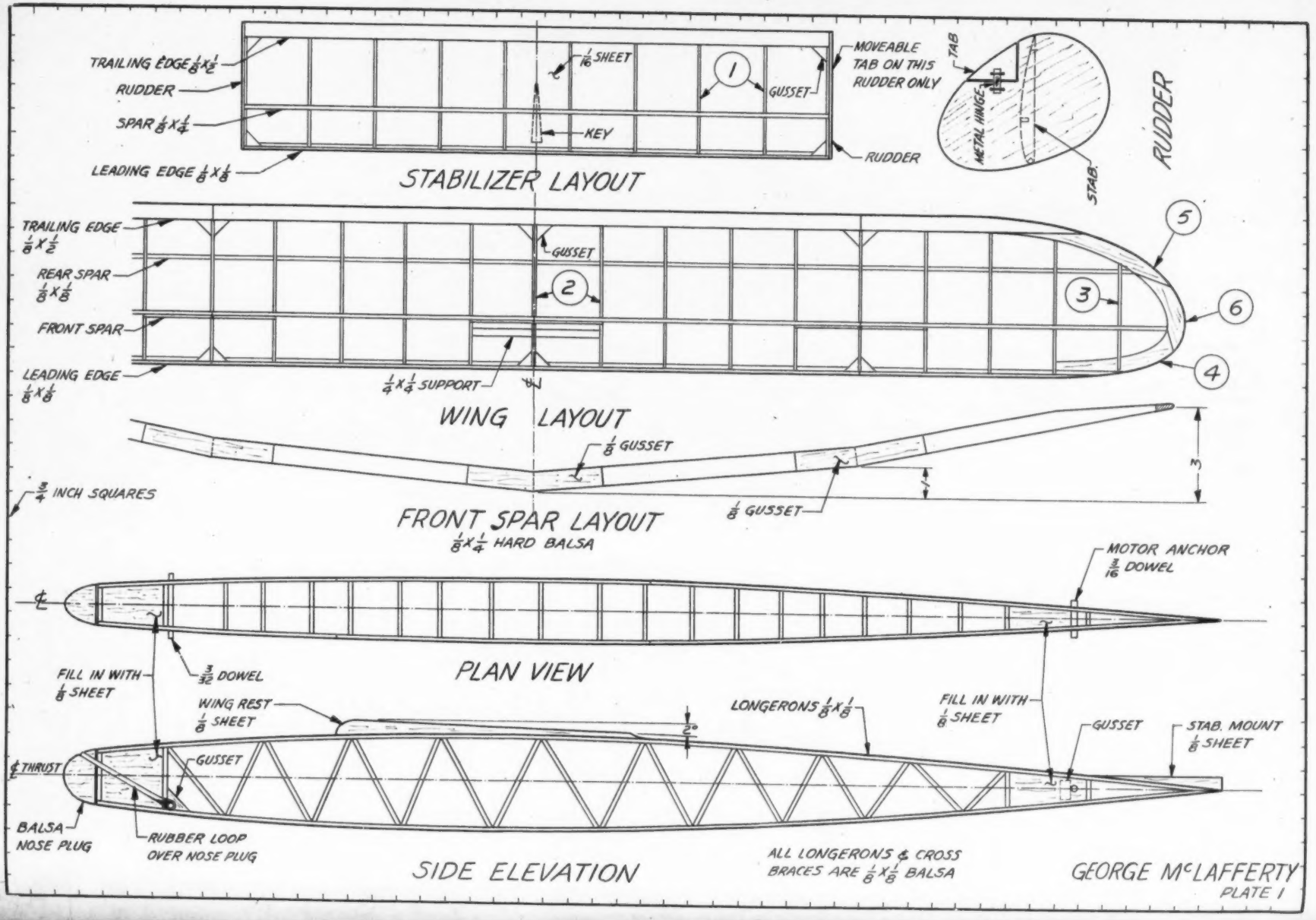
WING—The airfoil section in the wing is an "Eiffel 431" with a 5" chord. Cut 18 full sized ribs and two tip ribs from 1/16" sheet. When they are cut out pin them all together side by side and sand identically. Cut in

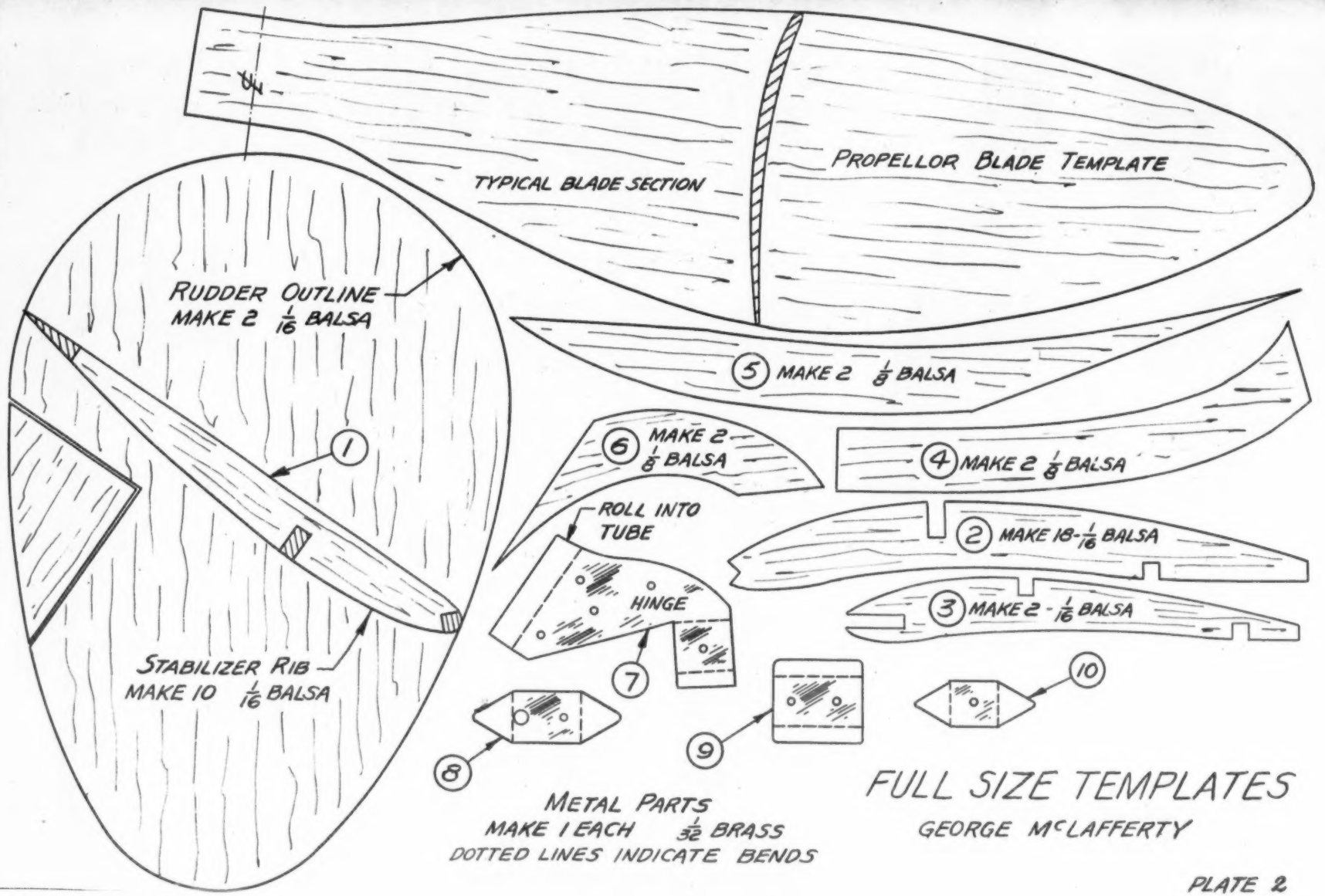
(Turn to page 81)







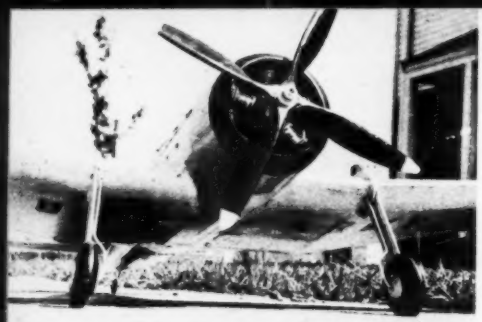

TRAILING EDGE 1/8 X 1/2
RUDDER
SPAR 1/8 X 1/4
LEADING EDGE 1/8 X 1/8
1/16 SHEET
KEY
1
GUSSET
MOVEABLE TAB ON THIS RUDDER ONLY
RUDDER
TAB
METAL HINGE
STAB.
RUDDER
STABILIZER LAYOUT
TRAILING EDGE 1/8 X 1/2
REAR SPAR 1/8 X 1/8
FRONT SPAR
LEADING EDGE 1/8 X 1/8
1/4 X 1/4 SUPPORT
GUSSET
2
3
4
5
6
WING LAYOUT
3/4 INCH SQUARES
1/8 GUSSET
1/8 GUSSET
3
1
FRONT SPAR LAYOUT
1/8 X 1/4 HARD BALSA
MOTOR ANCHOR
3/16 DOWEL
PLAN VIEW
FILL IN WITH 1/8 SHEET
3/32 DOWEL
WING REST 1/8 SHEET
LONGERONS 1/8 X 1/8
FILL IN WITH 1/8 SHEET
GUSSET
STAB. MOUNT 1/8 SHEET
THRUST
GUSSET
BALSA NOSE PLUG
RUBBER LOOP OVER NOSE PLUG
SIDE ELEVATION
ALL LONGERONS & CROSS BRACES ARE 1/8 X 1/8 BALSA
GEORGE McLAFFERTY
PLATE I



FULL SIZE TEMPLATES

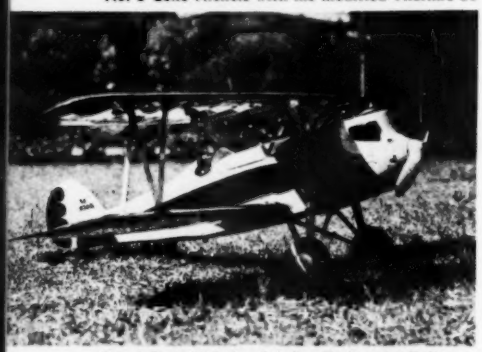
GEORGE McLAFFERTY

PLATE 2

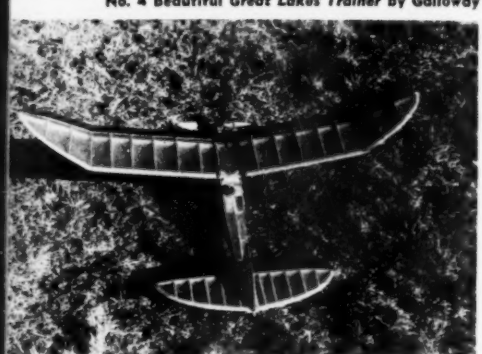


No. 2 G. B. Lenz's *Vought* has 5 cylinder gas motor

No. 3 Gene Nichols with his modified *Thermic 50*

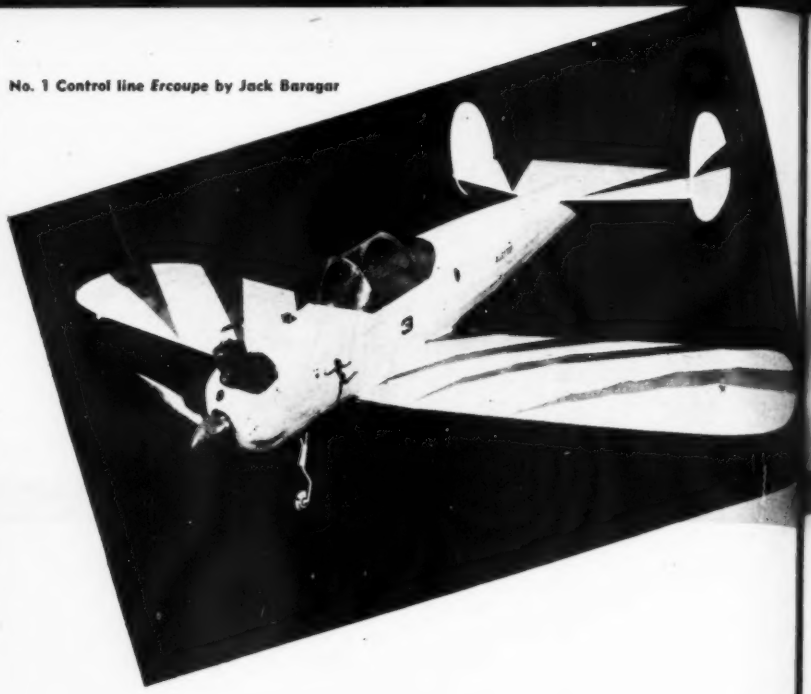


No. 4 Beautiful *Great Lakes Trainer* by Galloway



No. 5 *Bulldozer* from the Pampas by Joe Ortner

No. 6 A. Slack built this flying scale *Dauntless*



No. 1 Control line *Ercoupe* by Jack Baragar

LATELY we have received quite a few letters from model building readers expressing a sentiment somewhat in this vein: "I entered my control line model in the event for this class at a recent contest; however my ship is just a sport flying type so of course I had no chance as the only event was for speed."

We have had observers at various control line events tell us that by far the most beautifully built or the best handled ships could not win or even place, as the super-powered racers easily outclassed them. Now we do not for a minute advocate the elimination of speed events. Control line flying is the ideal means of obtaining the very top speed from a model, yet keeping it safely under control, something that could not possibly be done in free flight. However, we feel more contest directors should realize that the majority of control line models are not built for speed alone but for any of a dozen other objectives, such as adherence to true scale, stunting, precision landing and so on.

Why not capitalize on the spectator interest that would be produced by a control line event for all features except speed. Points could be allocated to these features: appearance and workmanship, degree of control exhibited which would include spot landing—aerobatics and handling in general, novelties such as landing gear retraction — parachute dropping — glider towing, etc. Possibly a few points should be given for reliability since a model builder who can put his ship perfectly through a whole routine when called upon should certainly be rewarded.

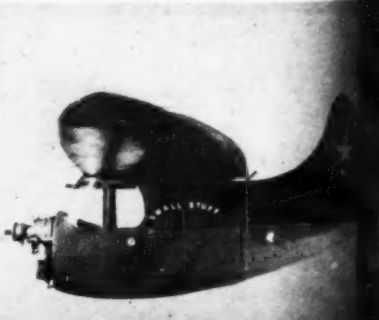
We have noticed that control line contests which are based upon speed alone do not hold the interest of many spectators, aside from those who hang around waiting simply to see one of the roaring demons tear loose from the wires and crack up. The casual onlookers usually stop to see what all the noise is about, stay long enough to follow a few dizzy laps, then move on to something with more variety. However, a contest such as outlined above would surely keep interest high, since there would always be some new trick or novelty to wonder over.

So far we have stressed the interest of the spectator, but don't forget that it is the spectators who are the future converts to modeling, who often furnish prizes for contests and who, in the person of the relatives of the flyers, provide the wherewithal for furtherance of the hobby.

As a rough guess, possibly a quarter of the control liners that are built are intended as out-and-out racers with perhaps another quarter designed with high speed as at least one objective. This leaves a large number of modelers out when the contest directors plan their control line events solely on the basis of speed. Why not include another event that would enable the other half of the control line modelers to get in on the fun.

An event of this kind would probably

No. 7 *Buc Special* of pine and balsa by D. Andrew



No. 8 Bud Johnson's gassie has no landing gear

News of model airplane experimenters from all parts of the world

AIR WAYS

be in the open class, since there would be no particular disadvantage in running the tiny Class A ships with the big C's if speed were not a factor. The high powered jobs might perform more spectacular aerobatics in that they could make dazzling loops and the like, but it seems likely that the builder with a moderate powered job could turn in a more consistent and winning performance in most cases.

It is felt that there should be no restrictions on the number of control lines used—one, two, three or even more. The contestant who could juggle four or five lines, keep them all untangled and make them really useful should certainly profit on his ability.

We advocate then, a true open event, with points allocated for all features except speed; a competent set of judges to pick the winners; and a chance offered thereby for the majority of control line builders to get in on the fun.

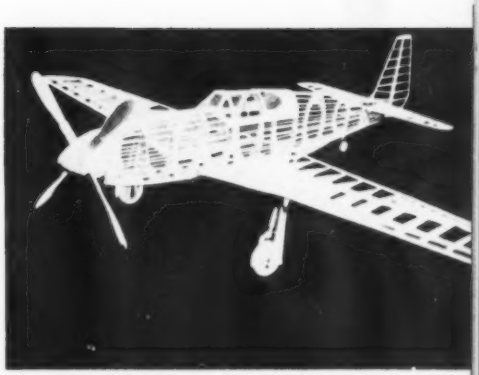
• •

Picture No. 1 represents Jack Baragar's first successful attempt at control line flying. The *Ercoupe* is powered by a *Super 60* and has had several hours flying time. Maneuverability is excellent. A throttle control was installed with very good results and the ship has been clocked at 70 mph. Jack, who lives at 389 So. Greenwood Ave., Marion, Ohio, says he has been in the airplane field for only the last six months. The model is certainly as sprightly as its nymph-like insignia (no magnifying glasses boys) and we want to see its successor before we start shouting "beginner's luck."

Gerold B. Lenz of 4368 W. 66th St., Cleveland, Ohio contributed the Chance Vought monoplane shown in No. 2. The model weighs about 4½ lbs. fully loaded and has a *Morton 5* engine. The ship was built 1½" scale and flies nicely on control lines. Jerry says spectators always become quite enthusiastic when he flies the ship. And why not, we even think it looks pretty good grounded.

The *Thermic 50* depicted in No. 3 was built by B. Gene Nichols, 333 C St., N.W., Ardmore, Okla. Gene says: "I modified the model slightly after it collided with a telephone wire and it is now very strong. In fact, it is the most successful towline glider I have ever built. One of my 'pet ideas' was incorporated in its construction: a most important factor in the success of a relatively slow flying model of this sort is the elimination of surface friction as much as possible. With this in mind I put a super finish job on the model and the result was perfect. Unfortunately the war curtailed contest activities down in this section of the country, but we are now all looking forward to some good contests. I have just completed a *Baby V Shark* and my first test seems to indicate it will turn out to be a pretty good model." How does your latest job compare with Stan Higgins' ship shown in No. 10, Gene?

(*Continued on page* 62)

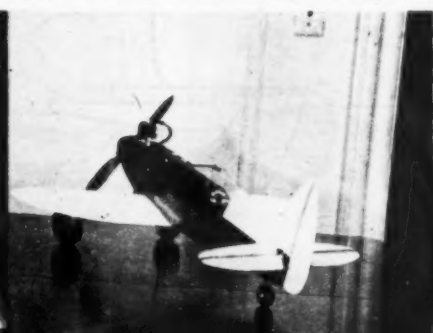


No. 13 Paul Ebert's built up scale *Mustang* P-51

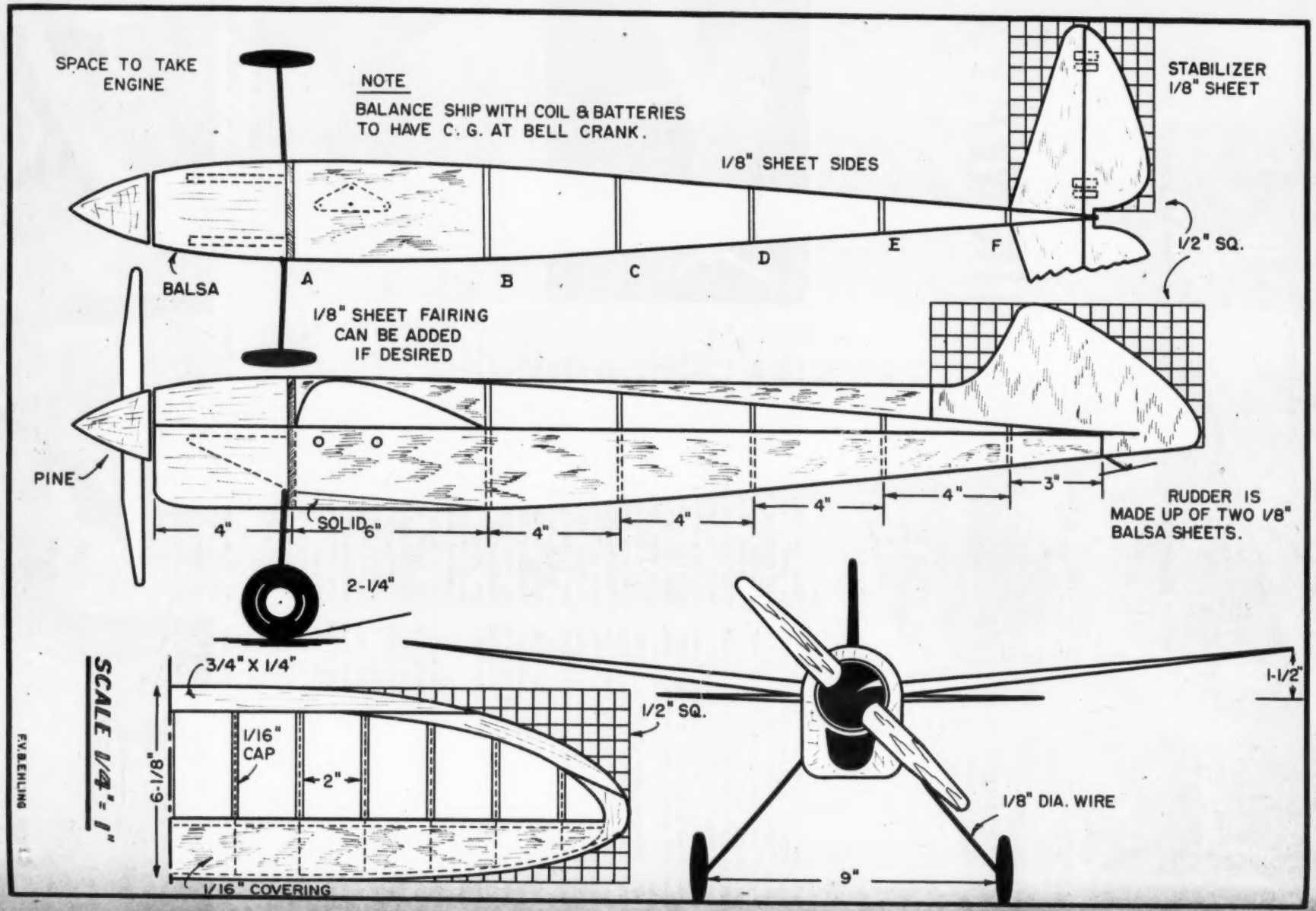
No. 12 Belgian original built by R. Van Anche

No. 9 D. Norton with his contest winning liner

No. 10 All balsa *V Shark* built by Stan Higgins



No. 11 Ortner's *Bulldozer* in a different pose


SPACE TO TAKE ENGINE
NOTE
BALANCE SHIP WITH COIL & BATTERIES TO HAVE C. G. AT BELL CRANK.
1/8" SHEET SIDES
STABILIZER 1/8" SHEET
1/2" SQ.
BALSA
A
B
C
D
E
F
1/8" SHEET FAIRING CAN BE ADDED IF DESIRED
PINE
SOLID
4"
6"
4"
4"
4"
4"
3"
RUDDER IS MADE UP OF TWO 1/8" BALSA SHEETS.
2-1/4"
SCALE 1/4" = 1"
3/4" X 1/4"
1/16" CAP
6-1/8"
2"
1/2" SQ.
1/16" COVERING
1-1/2"
1/8" DIA. WIRE
9"
F.V. BEHLING

by FRANK EHLING

'FULL BOOST'

Here is a really hot job for the control line enthusiast

CONTROL line models are usually similar to other types of airplanes; however now and then you come across one that outwardly doesn't look as if it were the ship that could do the trick, yet it has what it takes. That is the case with *Full Boost*.

This model was designed to handle easily, with speed as a second thought. Test flights with little power proved we had achieved our primary object; on later trials when more power was added signs of clean design showed up. This is what led us to see just what we could get out of her.

To start with we thinned out the wing. To do this we used a solid wing, as here we could get a better finish. The same plan was used, however. No dihedral was added as the wing could be made in one piece, which makes for a stronger wing. A large spinner was used to get the hub of the prop cleaned up along with a cleanup of the fuselage.

Finish is one of the important things to keep in mind when completing the ship as here a few extra miles can be added. Be sure to fly a clean ship as dust on a model cuts down performance.

CONSTRUCTION—This has been kept simple and the only caution is to use plenty of cement, sanding all parts well.

FUSELAGE—Enlarge the plan to the required size. This can be done with a pair of proportional dividers or by photostating. Start construction by cutting the fuselage sides to proper shape. Cut out all the bulkheads, remembering "A" is cut from 1/8" plywood. Cement the sides together at the rear and work forward, cementing in the bulkheads. Cement stringers in place. The cowl blocks are then cemented in place lightly as they are to be removed and hollowed after they are shaped. The engine bearers can be bent and bolted in place.

WING—Here you have your choice—either wing is all right. The built-up wing is made in much the same manner as any other wing; the solid wing is similar to a glider wing. Be sure, however, to use wood filler and to sand smooth. Dihedral is optional and not advisable in the solid wing.

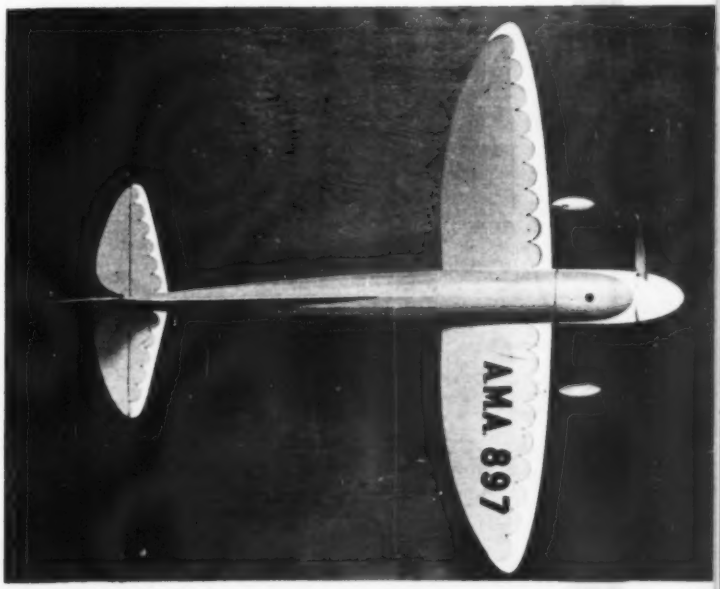
STABILIZER—This is constructed like the solid wing and should be finished much the same.

RUDDER—Here it is advisable to laminate the wood so that most strength can be obtained from a given thickness of material.

IGNITION—Install the ignition, endeavoring to get the C. G. at the bellcrank, which should be installed last in order to further this aim.

Cover the whole ship with tissue. This bonds all surfaces and produces a better paint job. Original ship was red with white trim, black lettering.

Flying is easy with this ship. Use little power at first until you get a line on her performance. Then apply full boost and watch the clock slow down.



These three photos show that *Full Boost* is really built for SPEED

CUT BULKHEADS FROM 1/8 SHEET
E
D
A
C
1/8" PLYWOOD
B
BELL CRANK 1/16" METAL
F
F.V.B. EHLING

RIB 1 2 3 & 4

RIB 5

RIB 6

RIB 7

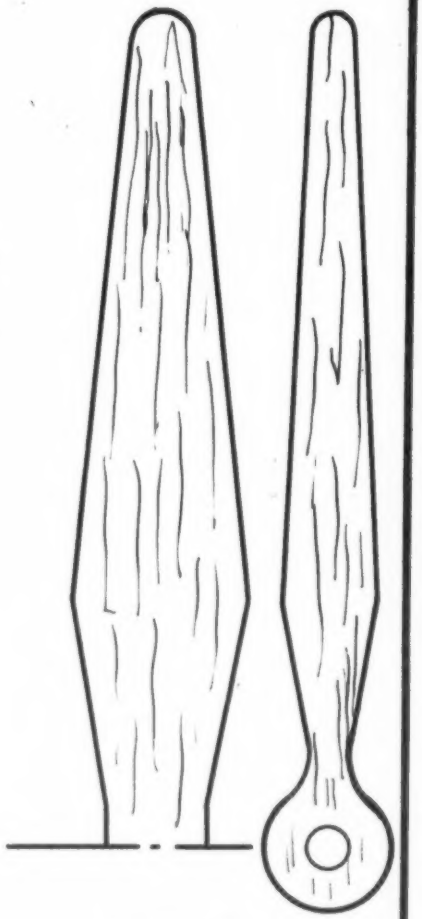
CUT ALL RIBS FROM 1/16" SHEET

WING SECTION FOR SOLID WING

STABILIZER SECTION

F.V.B. EHLING

USE HARD WOOD FOR PROP

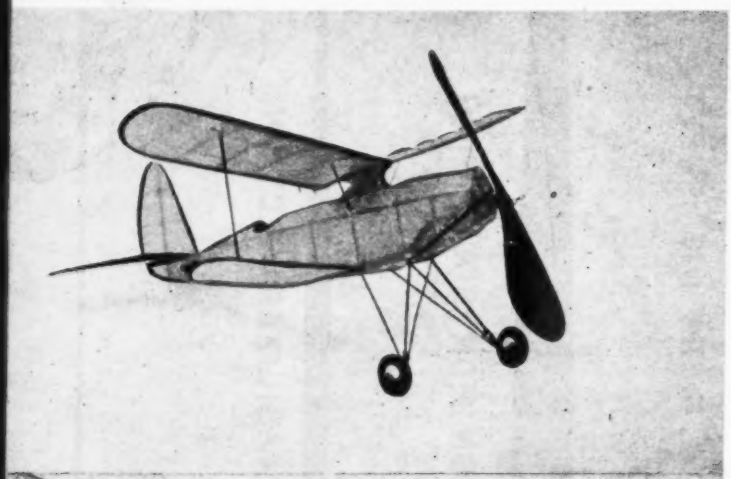


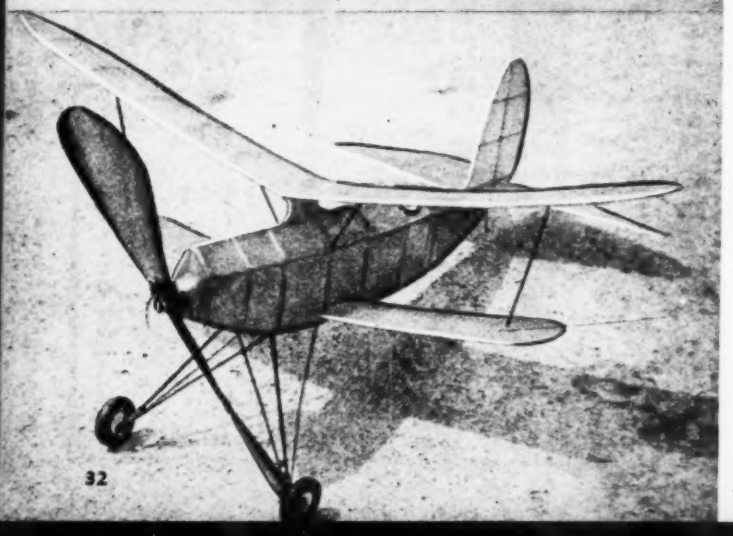
PROP DETAIL

by JAMES TANGNEY

Even the experienced builder will appreciate this simple biplane.

Scrappy





HERE is something rather unusual: a biplane model that gives monoplane performance. It is called *Scrappy* because it can be made almost entirely from odds and ends found in nearly every modeller's stock. Some 1/16" sq. strips, scraps of 1/16" and 1/32" sheet, bamboo, wire, tissue, and an 8" prop are about all you need to build *Scrappy*.

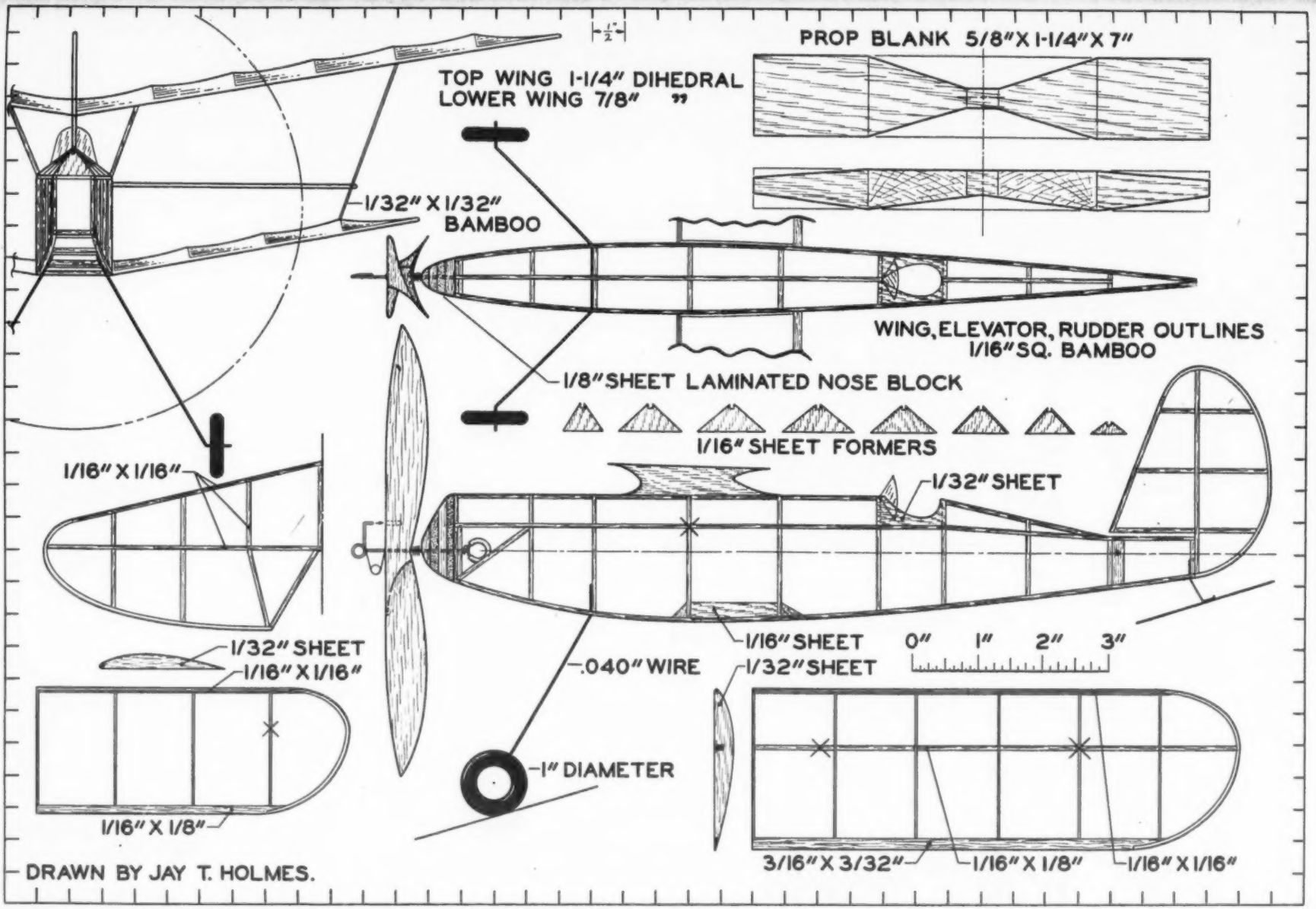
The fuselage is constructed in the customary manner. Two sides are made and spacers inserted. To provide strength where strain is greatest, pine is used at the nose and tail as shown on the plan. The width may be obtained from the former patterns. The formers and top stringer are added last. Before adding the landing gear, cover the bottom of the fuselage. The 3" strut is molded by heating the bamboo over a candle with the shiny side to the outside of the bend. Bind and glue to the fuselage. The other struts are sharpened on one end and forced into the fuselage about 1/16" and glued. The other ends and the axle are bound together and glued. All true lengths given do not include parts of strut forced into wood. Hold the 1" wheels in place with a celluloid washer and a drop of glue.

The prop may be an 8" machine-cut, or may be carved from balsa or pine. The nose block is laminated from 1/8" balsa and 1/32" pine. A plug is made of 1/16" x 1/8" pine. Two bushings made from tin can metal are drilled and bent as shown in the drawing. The hole in the nose block is drilled oversize to prevent any binding in case the shaft becomes bent. Before glueing the bearings in place check the thrust line. Now bend the shaft. The free-wheeler spring is made from U control wire. Be sure it does not press hard against the prop when fully extended as this prevents free rotation. A small ball bearing washer is preferable but a few flat washers will suffice. Cover the hook with tubing to prevent cutting the rubber. Six strands of 1/8" flat rubber are enough to provide a snappy climb.

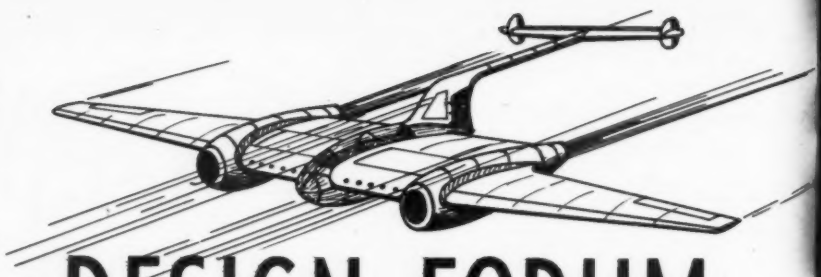
Except for the curved outlines of 1/16" sq.

(Turn to page 90)

MOI



DRAWN BY JAY T. HOLMES.



DESIGN FORUM

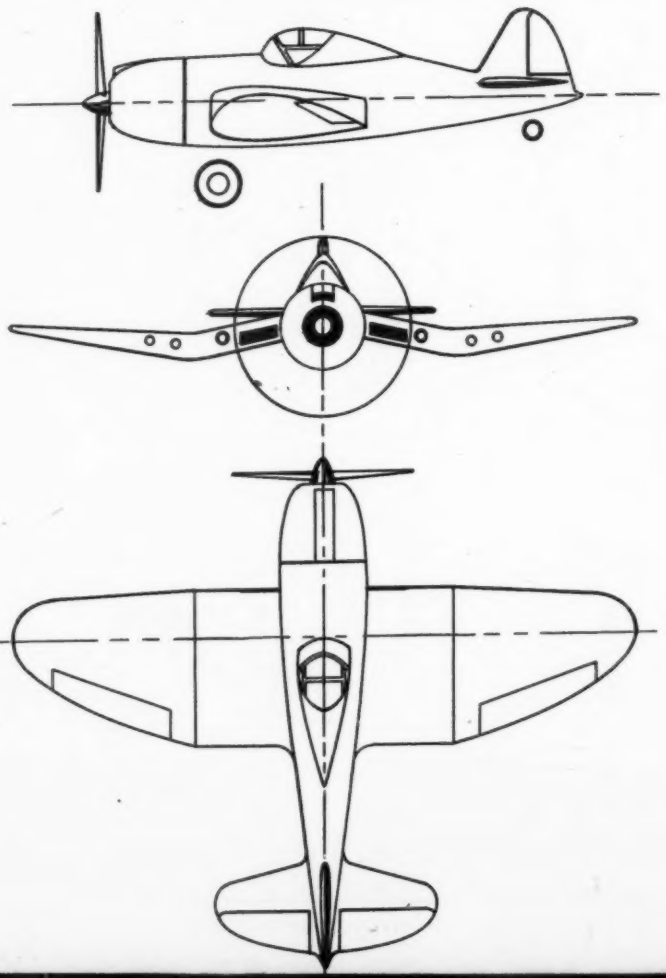
by **CHARLES H. GRANT**

IN DESIGNING an airplane a clear picture of its purpose must be kept in mind. Is it to be a pursuit ship, a bomber, a sport plane or a commercial transport? The first step in designing is to determine the performance required of it. Is it to be fast, with little load, a load carrier, a fast climbing plane or a low or high altitude ship? These and many other requirements should be carefully noted because they influence the type of the aircraft that must be built to fulfill them and its design. A designer must know how to translate these various performance requirements into aerodynamic form and airplane structure. He must understand the forces involved and the value and how they change in any particular design during flight.

These forces must be so arranged that the plane not only fulfills its performance but remains in proper flight balance through any phase of this performance.

(*Turn to page* 54)

Above, a snappy twin jet fighter in which the pilot lies horizontally. Below, a more conventional design for which the originator has great hopes



3 New Flight-Controller* Fighters

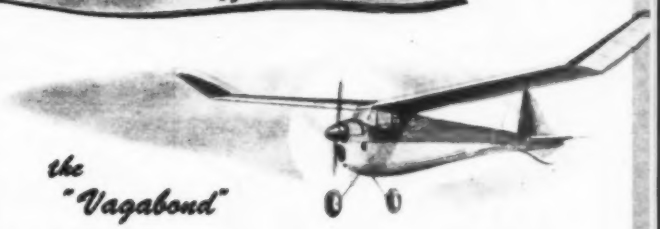
Again Eagle is first. Recognizing the tremendous trend of controlled flying toward scale, stunt and aerobatic models, three top-notch design experts have developed for Eagle's Engineering Department, the best Flight-Controlled* models of the hottest fighters of the entire war. The Republic P-47N, the Grumman Hellcat F-6F-4, and the No. American Mustang P-51H. Each is authentically scaled (¾—1" and 1"—1') and is paramount in exciting real flight characteristics. The amazing new Flight-Controller system permits full flight maneuvers. Combat flying is easy and enables you to outmaneuver an opponent. Every kit contains the finest selected Balsa and Hardwoods, printed wood sheets, Stream-lite wheels, prefabricated canopies where needed, heat treated tungsten steel landing gear materials, liquids, and many extras. Eagle's finest detailed plans are engineered to save building time and assures all model builders of reproducing these top-notch design tested Flight-Controlled models. Each kit, less motor $4.95

*(pat. pending)

EAGLE leads all fields!

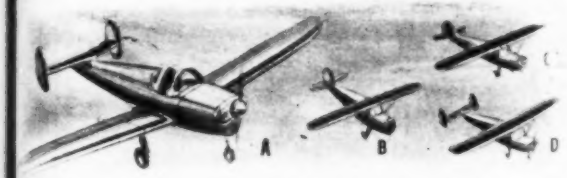
the "Dreamer"

The Dreamer with the Flight-Controller*, was developed for speed, sport and precision flying powered with any "A", "B", or "C" class motor. To date the Dreamer has substantiated reports of speeds up to and including 112 mph and has won five contests in a row with speeds ranging from 87 to 96 mph according to official records. The wing span is 19 inches. Full construction details for the Flight-Controller system plus parts assembly assure accuracy and save building time. All parts are printed on clear Balsa • Cut-to-size rudders and stabilizer • TURNED and SANDED nacell and booms • formed landing gear • Stream-lite wheels • a flying handbook.
COMPLETE KIT, less motor $7.50



the "Vagabond"

The Vagabond continues Eagle's policy of offering the newest, most advanced, and best models obtainable. This realistic cabin type endurance model opens all fields of model flying in its class. Designed and engineered by William Winter, editor of Air Trails Pictorial, the Vagabond combines every essential for successful gas model flying. The complete kit has all parts printed on Balsa • Die-cut plywood firewall • Formed landing gear • Stream-lite wheels • Eagle's new style, clear, crisp, engineered plans • liquids • a special handbook on flying your model written by the designer. With 74" span the Vagabond is designed for "C" class motors.
COMPLETE KIT, less motor $5.50



4-Way Flight Series

These are the first and only dual-type 4 WAY flying kits ever offered. Own any one kit and you have both a gas and rubber job—easily convertible from one to the other and back again. Kits are complete and generously filled with material and illustrated plans for all types of models. Add a few accessories and you're ready for gas thrills including Tether and Control-Line flying. These kits are a revelation for design-idea and for flight performance with realism that is thrilling to see. Each $1.00.

A—ERCOUPE
B—MONOCOUPE
C—PIPER CUB COUPE
D—SKYFARER

Fighters..Endurance..Private Planes

New models . . . new construction . . . new post-war planes with heretofore unrevealed details. These are Eagle's new exciting rubber models featuring Redi-form* construction which cuts down tedious building time by 65%. Endurance models designed to fly as sport and contest models, featuring retractable landing gears and easy conversion to towline flying. Also the wars best fighters and two new light planes. Kits contain printed Balsa • Tissue • Rubber • Wire • Wheels • Plans. EACH KIT ..... $.50

A—ROCKET
B—SKY KING
C—THUNDERBOLT
D—TAYLORCRAFT
E—HELLCAT
F—STINSON

Free

As a special service feature Eagle offers a handbook free to all model builders. This handbook will explode the many myths regarding the inversion of your model gasoline engines. Read how they can be made to last longer. Complete data is given on inverting all popular motors made. Read how many new design features are made practical by using your motor in the inverted position. This handbook foreshadows many new developments now on the boards of the Engineering Department. Send for your FREE handbook immediately.

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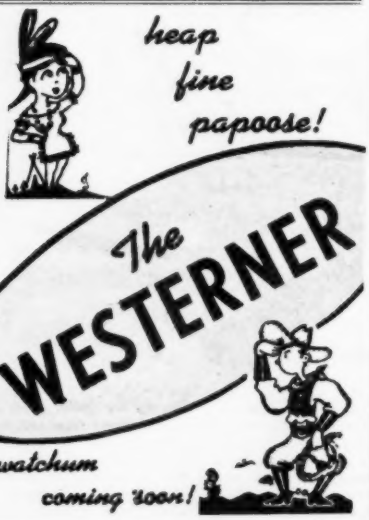
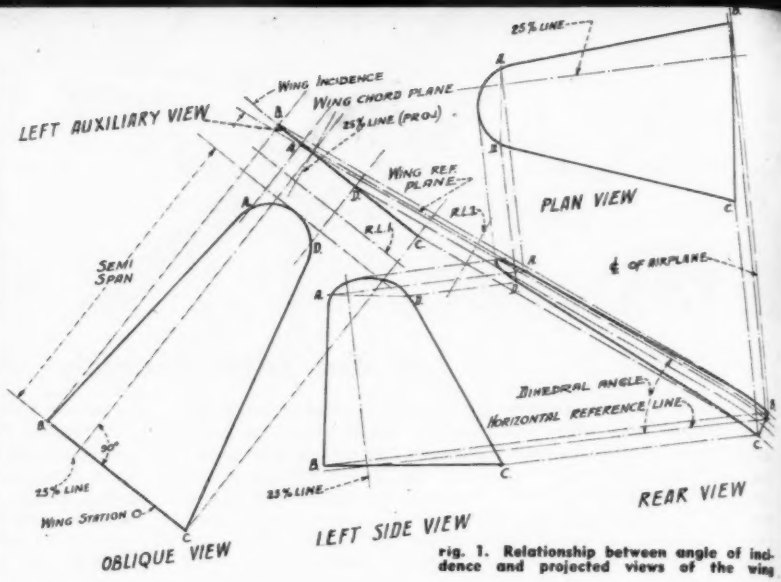
EAGLE (H&F) kits are leaders at all dealers. If none near you order direct, including 20c per kit to cover packing, postage.

Eagle MODEL AIRCRAFT CO.
(DEPT. MAN-12) 257 WATER ST., BROOKLYN 1 N Y





rig. 1. Relationship between angle of incidence and projected views of the wing

PLANE DRAFTING

Oblique views and geometrical planes are explained fully in this second part of a complete series

by WILLIS L. NYE

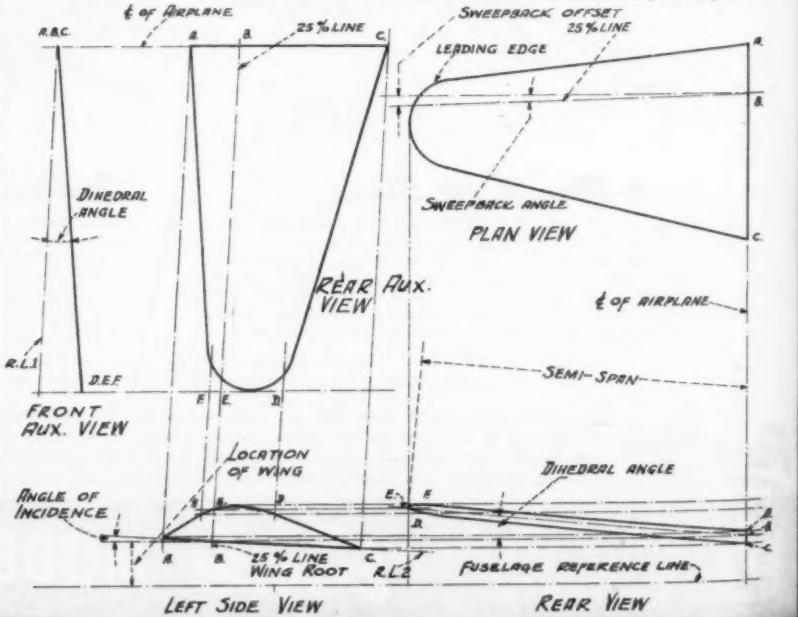
PART TWO

GENERAL—The function of an oblique view is to show the structure of a model airplane in an oblique position. An oblique position is defined as one which is drawn neither horizontal nor vertical, but is shown on a slanted major axis. This kind of view is usually drawn with the major axis of the model airplane 30 or 45 degrees from the horizontal. Oblique views are used because in some instances it is possible to describe and to dimension a principal view by means of an oblique view in such an illustrative manner that little clarification is required by the novice model airplane builder to understand the various details. Oblique views are drawn to scale and correct proportion. The dimensions should be obtained from the plan view.

GEOMETRY OF THE DIHEDRAL ANGLE AND THE ANGLE OF INCIDENCE OF A WING—In Fig. 1 the angle of incidence and the dihedral angle of the

(*Turn to page 40*)

Fig. 2. By use of a layout similar to this the designer can develop the wing chord plane



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Solid Model $1.00

All balsa, shaped Ray rings. A dandy model of the latest scientific achievement.

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Fired from a gun by means of a rocket projectile. A radical, interesting departure in models.

RAY LAUNCHING GUN $1.00
RAY ROCKET UNITS, 12 ..... 1.20
RAY ROCKET MODEL $1.00

THE VAGABOND $.50

Class C. 74" Span. Designed by William Winter.

MERCURY $.50

Class C. 72" Span. Wing area 720 sq. in. A beauty and only 2½ lbs. wt. complete.

JERSEY JAVELIN $.35

Class A or B. 48" Span. Consistent performer at contests. Anybody can build it.

SUPER YOGI $.35

Class A or B. 42" Span. A sensational pusher design with radical features.

PLAYBOY SR. $.10

Class C. 70" Span. A consistent prize winner. Kit contains fine material.

PACER "B" $.35

Class B. 53" Span. Original design from which prize winning Class C job was scaled.

GAS MODELS

More Free Flight

CLASS A		CLASS B	
ROCKETEER	$2.95	PLAYBOY, Jr.	$2.50
TOPPER	3.50	LARKET	3.50
ROAMER	2.95	CORONET	3.50
STRATOSPEAR	2.95	CLASS C	
SPEARHEAD, Jr.	1.95	PACER	4.95
JIFFY	1.50	BROOKLYN DODGER	3.95

CONTROLLED FLIGHT

THE DREAMER $7.00

With Flight Controller. Used with Class A, B or C motor. Direct control to elevators. A de luxe kit.

TETHER SHARPIE, less hardware $1.00
TETHER STREAK, Class C, less hdwe. 1.50
FALCON SPEEDSTER, Class B or C 3.95

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COILS: Wico	1.95
Aero Spark	2.50
CONDENSERS, metal	.25
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FLYWHEEL, brass	1.50
LEADS, high tension	.15
PLUGS, spark, all sizes	.50
PLYWOOD, 1/16", 1/8", sq. ft.	.40
PROPS, gas, 9", 10", 11", 12"	
Plain wood finish	.25
Lacquer finish	.50
SANDPAPER, package	.10
TIMER, Austin	1.50
TISSUE, silkspan	.10
TUBING, rubber ..... ft.	.02
WHEELS, sponge rubber, 2"	.40
2½"	.50
3½"	.60
WIRE, ignition, 3 ft.	.10

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CHISELS, wood carving, set of 6	$3.00
DIES, 0-80, 1-72, 2-56, 2-48	1.50
DRILLS: from 61 to 80, each	.15
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from 1 to 60, in case, set	11.50
FILES: Swiss, jewelers, 12 in case	4.50
HAMMER, jewelers, brass head	1.00
PLIERS: diagonal side cutting	1.50
long nose	2.50
heavy cutting	3.00
wire forming	2.00
SCREW DRIVERS, jewelers, set of 6	4.50
TAPS: 0-80, 1-72, 2-56, 2-48	.60
TOOL SETS:	
#1 Asst. of 12 grinders, buffers, burrs, etc.	3.50
#5 Asst. of 12 burrs	2.40
#9 Brush set, 12 assted	1.60
#36 Asst. of 36 wheels (all kinds)	7.50
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Closed adjustment	.75

X-acto SANDER with refills 50c

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Saw, complete	1.25	Knife Chests at $3.50, $5.00	

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Beautiful models of one of the war's deadliest weapons. A fighting panther taking on all sizes. Available in several price ranges.

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A super-detail model of a famous Coast Guard Cutter built in 1936 at the Philadelphia Navy Yard.

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A superb replica of the famous war-time design which so heroically stood the gap when shipping bottoms were sorely needed. Unusually complete with cast metal fittings and brass turnings.

THE WEASEL

Contains over a hundred parts. All hardwood. Most parts finished or semi-finished. An exact replica of the Army's personnel and cargo carrier.

$2.00

JEEPS

All sizes; made of many kinds of material but each kit complete. Build a model of this war-born military vehicle.

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Complete Line of Military Models

We have a most complete line of militarily models of all prices and types, featuring half-tracks, scout cars, tanks, anti-aircraft guns, searchlights, amphibians, etc.

We stock a full line of boat models in all sizes and prices including fittings. You can order any type and we can fill it.

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Kits illustrated all have either turned or shaped parts.

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A rare find in a popular design.

MIGHTY B-29 SUPER FORTRESS

Models of a mighty plane. Available in several sizes. $1 $2

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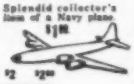
An unusually complete kit that is durable.

P-51 BLACK WIDOW

Finest solid model all balsa kit ever made. $3.00

GRUMMAN SKYROCKET

Splendid collector's item of a Navy plane. $1.00

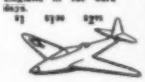


$2 $2.00

SPITFIRE

The plane that saved England in the dark days.

$3 $3.00 $7.00



B-17 FORTRESS

Exactly like the prototype—a giant in value. $5.00

FLYING MODELS

SPARKY

All balsa. Easy for beginners. 65c

GULL $1.00

A simple, good outdoor flyer that's complete.

AVENGER

A famous Grumman model, designed for easy jig assembly. $1.00

P-40 WARHAWK $3.00

Extraordinarily complete—it's a beautiful model.

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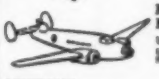
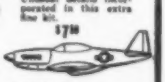
Unusual details incorporated in this extra fine kit. $7.00



MUSTANG $1.00

Keil Craft construction in 3/4 scale.



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Detailed Navy ship in Keil Craft construction

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NEW DUAL PURPOSE Rechargeable *Storage Battery*

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for both Model Ignition and Flashlights, only

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KIT Contains:

1—**Rechargeable Storage Battery**, latest contribution to gas model flying. Outlasting 400 dry cells in actual flashlight tests, this new electric energy source is so strong "no booster is required" in starting of gas engines used in flying models. Eliminates the "bugaboo" of mis-firing. Can be recharged over and over again. Cost $2.95 purchased separately.

2—**Home Charger.** Plugs into any standard as 110 volt outlet. Requires no more "juice" than an electric clock. Indicator lamp shows when battery is charging. Battery can be kept on "charge" indefinitely.

3—**Specially designed plastic Flashlight**, same type used by the Navy. Unaffected by wide temperature variations. In standard gray color.

4—Battery wrench, water dropper, and charging instructions.

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Same as Home Kit, except that charger is the Automobile type. Connects to auto or boat ignition system (6 volts) without interfering in any way with vehicle operation. Only..... **$6.95**

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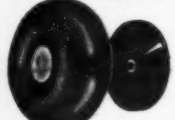

Rubber is back! You can now get 2" diam. hard rubber wheels with brass bushing for U-control jobs. 50c ea.

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Accurate, authentic plans for building every "name" plane fighter or bomber. In Plan Packet assortments, ea. $1.00. Plan Folio No. 1, Class A & B Control-liners. $1.00

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A brand new Varney Kit! Scaled 1" to 20', fully 15" long. Has molded hull, set of 4 guns, diving plans, propeller, rudder, wood mounting support.

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¾" scale amphib, with machined parts, molded track-shoes, die-cut axle-trim. (pp $1.25)

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Exclusive Polk pre-fabricated kit. Movable tread-turret. Large plans. Pre-fabricated wood-pulp assembly units. Scale ½" to 1". Complete Kit $2.00 (pp $2.25).

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An amazingly accurate model. Gun elevates, swivels, wheels move. Scaled ¾" to 1". A splendid kit to build! A splendid gift for Xmas! Complete Kit $2.95 (pp $3.20).

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All aluminum. An unbeatable Christmas gift!

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No. 62 X-Acto double knife set—2 knives and 10 assorted No. 1 blades $2.00

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Note to Parents: Here's the answer to what to give your boy for Christmas! There's no finer gift! X-Acto knives and Knife Chests are standard cutting tools used by every modeller. Start your Xmas buying now and be ready for Santa's visit!

Selected Tools For Accurate MODELLING

Drill set (illustrated) with 2 partitions that fold down into compact metal case, furnished with drills from size 61 to 80 $3.50—Electric soldering iron (illustrated) heats in 90 seconds, draws only 17 watts. Length 7 inches $1.95—Needle files, 4", set of twelve $3.50—Screw driver with set of 6 shafts $4.50—Tweezers, pointed 90c—Tweezers, self-locking 50c—Vulcanite chisels, set of 6 $3.00—Jeweler's saw frame $2.90—blades 50c doz.—Steel anvil $2.25—Murphy carving knife 65c—Brass double-end pin vise $1.25—Single-end pin vise 75c—Taps 0-80, 1-72, 2-56, 3-48, each 65c—X-Acto Sander, 3 grades of paper 50c—Sanding stick 35c—Balsa stripper $1.00—Gouging Chisel, set of 6 $4.50.

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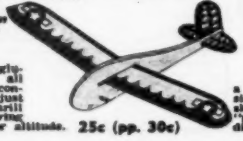
No finer Kits made. Each complete with parts, plans. P6Y Hellcat, wing span 8-1/32"—P-47 Thunderbolt, wing span 7¾"—P-51 Mustang, wing span 6-15/16"; each Kit 90c. P-38 Mitchell 13¾"—B-26 Marauder 13½", each $1.00. (Add 15c for pp)

FERNDAY SOLIDS

Only kit with formblocks and extra parts. ½" scale plans. All 1/4" scale Jap Zero, Spitfire, Airacobra, Mustang, $2.98; P-38 Lightning $3.50; Thunderbolt, Hellcat $4.50. (Add 10% for pp)

NEW "ZOOMER" GLIDER

Requires no cutting-gluing. 19" wing span, all balsa. Here's a real contest winning glider just released that will thrill you! You adjust the wing for distance, speed, or altitude. 25c (pp. 30c)



NEW DE LUXE BLACK WIDOW KIT $3.95

(pp. $4.20)

Mairecraft gives you this famous Night Fighter in a new ½" scale solid. Kit includes 3 large-size plans and assembly sheets, turned nacelles, shaped fuselage, tail, wings, formed celluloid "greenhouses," cast metal props, engines, radiators, and die-cast black treaded wheels.

DEALERS: The next few years will see a tremendous increase in both manufacturing and purchasing of hobby and model craft. The Polk organization has a planned expansion program to keep in step with this growth—plans that include greatly increased facilities—more prompt and efficient methods of handling orders and billing by modern and costly bookkeeping machinery—speedier handling and delivery because of early return of former employees from the services.

As a Dealer, you will directly benefit by this program. As your buying increases, the economics of "Purchasing from Polk's" will correspondingly increase, because Polk's fully intend to maintain leadership in the field by stocking every worthwhile, saleable item of hobby merchandise that hits the market. Your bulk buying means single shipment—single checking—single billing—single payment! And you'll be first—with the latest.

Since 1935 — the Nation's Leading Hobby House

'46 is our 10th.

"In December 1935, when our business was established, modellers had precious little to work with. There was no elaborate kits; detailed and 'show-how' plans were non-existent! Material, proper tools, and building aids were hard to get. Despite these handicaps, many hardy, persevering modellers completed precisely-scaled models that even today are considered masterpieces in detail and workmanship!

Being modellers ourselves, we decided to enter this uncharted field. Only a few manufacturers were then in business. Established sources yielded pitifully little stock. Dependable sources had to be found. Small manufacturers in related fields were cajoled into producing items suitable for hobbyists. It was digging, pioneering, and hard work from the day we opened our doors.

Many youngsters of yesteryear—whose introduction to hobbies began with their initial purchases in our earliest days!—took our advice and encouragement to enter a hobby business of their own. We've watched and helped many start as designers, manufacturers, retailers and specialists. Many of today's hobby personalities started their career in our employ!

After 9 years of pioneering, POLK'S roots are implanted deep in the hobby field! More than likely we served your Dad! NOW, on the threshold of our 10th Anniversary, we look forward to serving your son—and succeeding generations of Americans!"

IRWIN & NAT POLK

Commencing 1946 — the WORLD'S Leading Hobby House!

VAGABOND

New entry in the field of gas model flyers, the Vagabond was designed by Bill Winters, model editor of **Air Trails Pictorial** as a cabin type endurance job. It's a Class C motored plane, with 74 inch wing span. Kit includes 3¼" streamlined wheels, parts, plans. By mail **$3.75**

TARPON

Speed sensation of the year, the Tarpon's unofficial 120 mph should satisfy the speed-seeking control-line flyer. Wing span 28½". Featuring the time-saving Redi-Hollowed fuselage, no carving is necessary. You can get this job put together and up in the air in a day's time! They'll be ready soon—order yours now! Complete Kit **$10.75** less wheels

DREAMER

Secret of the tremendous overnight popularity of this gas flyer is both the new method of flight control, and the fact that it does not require an expert to build or fly it. Embryo modellers have already won contests using stock motors. Wing span 19". Kit complete **$7.95** (pp. $7.75)

STRATOSTREAK

Here's a Garami Atom job featuring a poly-hedral wing design, with a span of 27". Combines excellent stability, exceptional balance, and includes the new Garami single-unit mounting of coil and condenser. Performance in high wind unusually good. Kit complete only **$2.50** (pp. $2.75)

VEE-GEE

Sensation of the U-Controls, the champion Vee-Gee has topped the field! Takes any engine from Class A to Hornet. Wing span 18", length 21". Complete deluxe Kit with parts semi-finished, spar beveled to shape. Exploded drawings. Kit **$10.00** (pp. $10.50)

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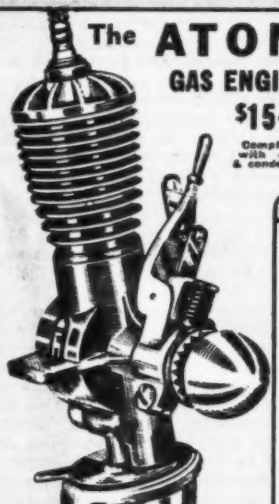

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Question: WHAT IS THE ATOM?
Answer: The smallest, lightest miniature gas engine made.

Q: HOW MUCH DOES THE ATOM WEIGH?
A: 2 ounces, including gas tank and sparkplug.

Q: WHAT ARE THE ATOM SPECIFICATIONS?
A: Bore ½", stroke ½", cu. in. disp. .097.

Q: WHY THE NAME ATOM?
A: Because the basic design incorporates ciratomic exhaust ports, a factor that gives the ATOM a remarkable high volumetric efficiency.

Q: WHAT IS VOLUMETRIC EFFICIENCY?
A: The percentage of gas vapor that actually enters the cylinder compared with the amount that could enter. Depends on design of gas valve passages, inlet and exhaust ports.

Q: WHAT CLASS IS THE ATOM ENGINE?
A: Class A, which is less than .20 cubic inch displacement (area x stroke). Class B is between .20 and .30; Class C is from .30 to 1.25.

Q: WHAT SIZE PLANE WILL THE ATOM FLY?
A: The ATOM has taken aloft giant models with as much as 4 foot wing span. For a correctly built gas model (wing loading at least 8 ounces per square foot of wing area) figure a minimum weight of 80 ounces per cubic inch of motor displacement.

Q: HOW CAN THE ATOM BE INSTALLED?
A: In any position, upright, vertical, or otherwise. Fuel supply functions regardless.

Q: WHAT SPARKPLUG IS USED?
A: V-3

Q: WHAT ARE THE CYLINDER AND PISTON MADE OF?
A: Molybdenum-Chrome steel, heat-treated and lapped to .0001" accuracy!

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Q: HOW ABOUT THE GAS TANK?
A: The ATOM gas tank is transparent, and is provided with a quick-refill port.

Q: WHAT IS THE OUTSTANDING FEATURE?
A: **THE ATOM DEVELOPS THE HIGHEST POWER TO WEIGHT RATIO OF ANY GAS ENGINE ON THE MARKET!**

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Plane Drafting

(*Continued from page* 36)

wing of a hypothetical model airplane are shown. The use of an oblique view is necessary to obtain the necessary projections in order to construct the other associated views. The function of this illustration is to show the true relations of the left side view, rear view, and plan view of the wing. By means of this illustration the rigging of the wing in relation to fuselage, as well as the attachment of the wing to fuselage, can be shown. For simplicity, the left wing of the *Whipper Snapper* (M.A.N., January 1945) is shown. The outline of the wing is used primarily because it is the same as the wing chord plane in the plane of the paper.

In Fig. 1 the true flat pattern of the wing in the plane of the wing chord is shown. In this illustration the left auxiliary view of the wing chord plane is shown at the proper angle of incidence at which the wing is to be set in relation to the fuselage reference line. The various projected ray lines and the function of each is self-explanatory. Project the rear view of the wing by measuring from reference line 1 along ray line A. This projection is parallel to the wing reference plane, and is to the rear of the left auxiliary view. After this initial measurement has been made, lay it off from reference line 2 along the same ray line in the rear view. Measure from reference line 1 to point B as shown in the oblique view. Then proceed to lay this distance off in the rear view along the associated ray line from reference line 2. To complete the rear view, similar operations should be undertaken in order to obtain points C and D of the wing chord plane.

To develop the left side view, add the dihedral angle between the 25% chord line and another line which is drawn horizontal. Project the ray lines of points ABCD from the rear view to the left auxiliary view. The projection of these ray lines of points ABCD is parallel to the horizontal plane previously drawn. Measure the necessary distance parallel to the wing reference lines points ABCD. These distances should then be laid off on the associated ray lines in the left side view from the 25% chord line. Connect points ABCD with straight lines to obtain the left side view of the wing. This left side view will show the wing setting wing at the desired angle of incidence and with the proper dihedral angle.

It is necessary to obtain an approximate check on the projections. Lines AD and BC are parallel. By geometry, these lines will also be parallel in the rear, left side, and plan views.

After the rear view has been completed, it is possible to draw the actual plan view of the wing chord plane at the required dihedral angle. Erect a centerline of the model airplane through the vertex of the dihedral angle of the wing. This line is also perpendiuclar to the horizontal reference line. Project ray lines ABCD parallel to the centerline into the plan view. The 25% line of the wing chord is then drawn perpendicular to the centerline. Measure the distances from the 25% line of the left side view. Measure the distance for point A. This distance must be laid off above the 25% chord line on its ray line shown in the plan view. The same procedure must be accomplished to obtain points BC. Points ABCD are connected in the plan view. This final operation shows the wing chord plane in the rigged position at the desired angle of incidence and dihedral angle. Extend

(*Turn to page* 42)

line BC and check if it intersects with the 25% chord line at the centerline. If line BC does not intersect with the 25% chord line at the centerline it is probable that an error has been made during the various operations or projections. If this does occur, the whole procedure for layout of the wing should be investigated for evidence of an error.

Geometrical Planes

GENERAL—The numerous types of wings in plan form, taper, airfoil thickness and various methods of construction used in model airplanes make it necessary that proper methods of development be used when preparing engineering drawings. Another typical example of wing chord plane development is shown in Fig. 2. In this example the wing plan development should be made with the basic wing chord plane drawn in the plane of the paper. This is necessary for accuracy when dealing with wings set at an angle of incidence in relation to the fuselage reference line, and which also have a dihedral angle.

WING CHORD PLANE DEVELOPMENT—In Fig. 2 it is assumed that the wing is a flat geometrical plane tilted at an angle, referred to as the dihedral angle. A similar wing plan form is used in this example as in Fig. 1. As in the previous example, the left side, rear and plan views are obtained by reference to the original three view drawing of the model airplane. Development of the layout of the wing may then be undertaken on the drawing.

In this example an assumption should be made that the single spar of the wing is located on the 25% wing root chord line, although any location of the wing spar other than this may also be used and developed in the same manner. By locating the single spar of the wing at the specific station where it intersects the centerline of the fuselage, draw the left side view of the wing to the specified angle of incidence in relation to the fuselage reference line. Note that in the plan view the relation of the wing is given to that of the reference line of the fuselage.

Project the 25% chord line from the left side view of the wing plane chord to the rear auxiliary view. The rear auxiliary view is drawn normal to the root of the wing chord plane at the specified angle of incidence. The left side view of the wing is projected as shown. Normal to the 25% chord line, draw the centerline of the model airplane. From the dimensions obtained from the plan view of the wing, complete the entire development of the wing. Proceed to draw the front auxiliary view, then draw a line normal to the centerline of the model airplane; from this line show the wing chord plane at the specified dihedral angle. Draw in the edge view of the wing chord plane which can be shown as a heavy line. In this example it is assumed that all dimensions are obtained from the original three view of the specific model airplane for which the wing is being developed. It is then necessary to project ray lines which are to be drawn parallel to the centerline of the model airplane. This operation locates the true lengths of the wing root chord and the wing tip chords from the 25% line of the basic wing root chord. For example, the true length of line AB is 25% of line AC. The true length of line FE is 25% of line FD. Line AC is the basic wing root chord and line FD represents the wing tip chord. When these points have been located, project the ray lines parallel to the 25% line to the left side

(*Turn to page* 44)

view in order to locate points ABCDEF.

The concluding part of this development is accomplished by obtaining the distances in the front auxiliary view, perpendicular to reference line 1 to points FED. Lay them off above reference line 2 on the respective ray lines in the left side view. Because points ABC already lie on reference lines 1 and 2, the point of intersection of these ray lines with reference line 2 is the proper location. By connecting points ABCDEF, a correctly projected view of the lines of the wing chord plane as they would appear on the completed model airplane is obtained.

Construction of the rear view is accomplished by projecting ray lines from points ABCDEF into the rear view. Measurement should then be made from the rear auxiliary view, parallel to the 25% line, and from the centerline of the model airplane to points FED. Normal to the centerline of the model airplane in the rear view; lay these points off on the respective ray lines. By connecting these points, a rear view of the wing is then obtained in the rigged position on the model airplane.

The final operation is the development of the plan view which is now a comparatively simple operation. From the left side view, obtain the distance normal to the point of location of the centerline of the fuselage, and the 25% chord line intersection. From the left side view, obtain the distances normal to this intersection to points ABCDEF. Show these points on the plan view. By drawing lines through these points, the plan view of the wing chord plane may then be shown in the rigged position. Note that the 25% wing chord line of the basic wing root chord sweeps backward from the point of intersection of this line and the fuselage centerline. This is caused by the dihedral angle of the wing chord plane when the angle of incidence is shown. It does not necessarily indicate that the wing spar is swept backward as part of the basic wing structure.

The function which is accomplished by this kind of geometrical development of the wing plane chord is that by following a similar series of developments it is possible to show other spars or structural members in the rear and the front auxiliary view. If this method of geometrical projection is used, it is possible to obtain the relationship of parts of the wing to the fuselage in the proper manner.

It is assumed by this discussion that before any structural drawings are made from the basic aerodynamic layout of a specific model airplane that the final dimensions, position of the wing, chord of the wing at the wing root, etc., have all been established as final. When this has been completed, the basic dimensions of other structural details may readily be developed. The discussion in this example is also applicable to the stabilizer and to the fin when necessary. In order to simplify the location of the points of the wing chord plane it is suggested that the wing tips be drawn straight, and rounded after the basic points have been determined.

(Part 3 will appear in the January issue.)

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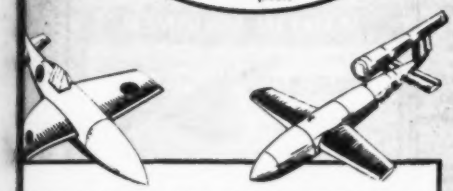

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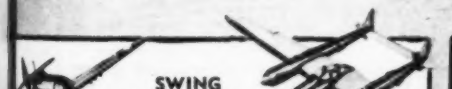

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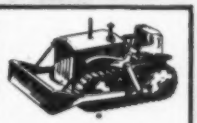

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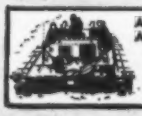

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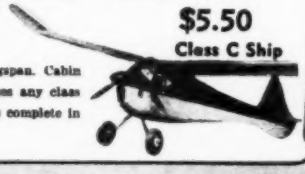

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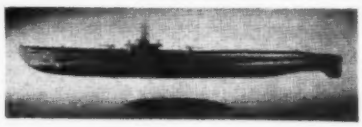

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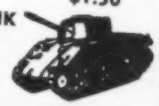

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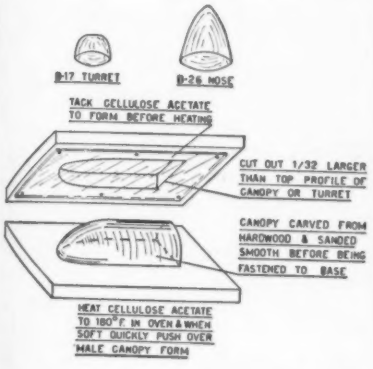
PLASTIC CANOPIES AND TURRETS

By CORP. JERRY STOLOFF

MANY a good scale model loses its beauty for lack of a proper canopy or turret. A very authentic canopy can easily be made with cellulose acetate, which can be purchased readily at model supply shops. Not only can canopies be made, but also clear plastic noses such as those used on the B-26 and other ships. It must be remembered that the material is heated and stretched over a form, therefore the thickness of the cellulose acetate must be great enough to withstand the stretch without breaking. The deeper the stretch the thicker the material used. On small scale models No. 10 cellulose acetate, which is equivalent to about 1/32", will prove satisfactory. Take care not to use cellulose nitrate, such as some negatives are made of, because it is highly inflammable.

To begin with, an exact form of the canopy or part to be made is carved out of hardwood slightly smaller than desired



and sanded to a smooth surface. The reason for the smooth surface is to prevent marring the inside of the plastic object when hot. The form is then cemented to a piece of flat wood and the male mold is complete.

From a piece of hardwood about ¼" thick, cut out the top profile of the canopy 1/32" larger than the wooden canopy form; this is to allow the thickness of material on either side when the canopy is molded. The cellulose acetate is tacked to the underside of the top form and placed in the kitchen oven which is set to 180° F. and left in until the acetate becomes soft and pliable. It is then taken out and quickly pushed over the male form and held down until cool. If it does not stretch properly at first, the acetate can be put back in the oven and re-softened.

Speed is essential when transferring the heated material to the mold as the acetate is thin and cools easily. After a satisfactory canopy is molded, trim off the excess material and mount the canopy on the model.

There is no limit to what can be done with this plastic. Whole fuselages can be produced by the method described, making the body in two halves and then cementing together. Nose cowlings can be made for gasoline power models by using thicker plastic. Be sure to wear gloves when working with the heated material to prevent burning your hands.

MORE ABOUT MODEL ENGINE PERFORMANCE

By Edward G. Ingram

TO DETERMINE how the performance of model airplane engines compares with that of full size two and four cycle aircraft engines, a table containing performance data for 17 model engines was presented in the June issue of MODEL AIRPLANE NEWS. A reader has inquired why more engines were not listed.

The explanation is that the information obtained from data on this number of engines was found sufficient to provide a good idea of how the rated hp per cu. in. of piston displacement and the weight per hp of model engines compared with similar figures for larger engines. It was originally intended to make the comparison on the basis of maximum brake hp of the engines which would have been more satisfactory. Because of business conditions, however, it was not found possible to obtain such data. Moreover, it is probable that many makers have never made brake hp tests of their engines.

The performance figures shown in the table were based on the rated hp piston displacement and engine weight as published or as furnished by the manufacturers. Many makes of model engines, including some that have been very popular, were not incorporated in the list. Because readers have expressed a desire for performance data on more models, figures for 13 additional engines have been computed and are shown in the accompanying table.

Lack of necessary specifications prevented inclusion of a number of other makes, such as Husky Jr., Syncro, Madewell, Trojan, Torpedo, Comet, Dennymite, Molner, Rocket and the Brown Class C models.

The additional engine performance figures presented do not make any material change in the picture of model engine performance obtained from the original study. For example, the average weight per hp for the 17 engines shown in the original table is 1.94 lbs. The average weight per hp for the engines in both tables combined is 2.02 lbs. A similar comparison for hp per cu. in. of displacement gives .619 cu. in. for the engines in the original table and .612 cu. in. for all engines in the two tables.

It is, perhaps, hardly necessary to point out that the accuracy of the performance data depends upon the correctness of the specifications published or given by the manufacturers. When dealing with small quantities, such as an engine weight of 3 or 4 oz., an error of a few tenths of an oz. is relatively large and will adversely affect the preciseness of the weight per hp. figure given above.

The article in the June issue contained one typographical error. It was in the sentence which read "Several Class A engines are said to be capable of running 20,000 rpm." The figure quoted should have been 10,000 rpm. The Mighty Atom Class A engine, however, has been listed as operating from 250 to 17,500 rpm. A Bunch Class C model equipped with a flywheel has been listed as capable of from 15,000 to 20,000 rpm. It has been stated tests conducted with a flywheel show that the Rogers Class B engine is capable of 20,000 rpm without overheating. It should be emphasized that the worth of an engine should not be judged on performance figures alone. For example, an engine with excellent performance figures would be a poor investment if it overheated and failed after a short period of operation.

In reply to an inquiry regarding the hp of the Bantam, the manufacturer says: "The hp rating was obtained by the fol-

(*Turn to page* 52)

DATA ON MODEL TWO CYCLE AIRPLANE ENGINES

(All Single Cylinder)

	Class	Piston Displacement	Rated Hp	Bare Engine Weight (ozs.)	Hp per cu. in. of Piston Displacement	Weight per Hp
Brat	A	.115	1/10	3-1/3	.870	2.08
Marvin	A	.140	1/10	4-1/2	.714	2.81
Bantam*	A	.199	1/7	3.17	.718	1.39
Dragon	B	.210	1/7	5	.692	2.19
High-Speed	B	.270	1/7	3-1/2	.529	1.53
Brownie E	B	.290	1/7	6	.493	2.62
Phantom P-30	B	.299	1/5	6	.669	1.87
Cannon 300	B	.300	1/5	6-1/2	.667	2.08
Cannon 359	C	.359	1/4	6-1/2	.696	1.62
Bunch Tiger Aero	C	.450	1/4	7-1/2	.555	1.87
Bunch Mighty Midget	C	.450	1/5	7-1/4	.444	2.27
Hurleman	C	.488	1/5	6-1/2	.410	2.03
Sky Chief	C	.526	1/5	10	.380	3.12

*See text for estimated maximum hp of Bantam.

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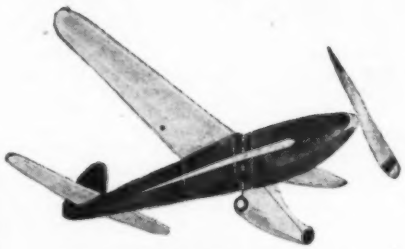

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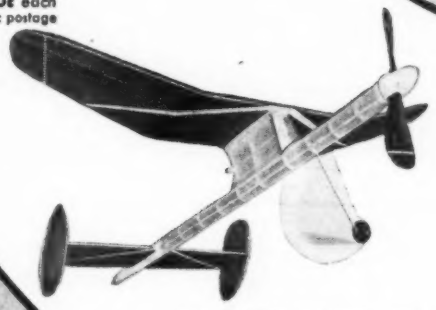

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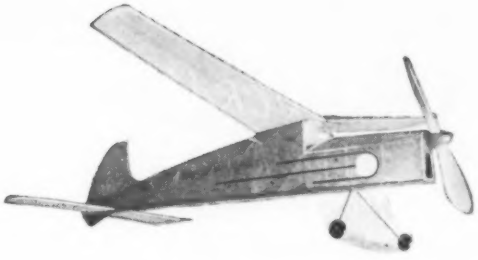

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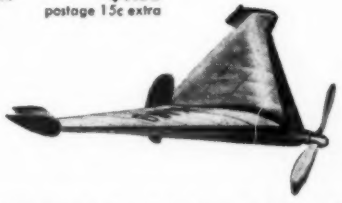

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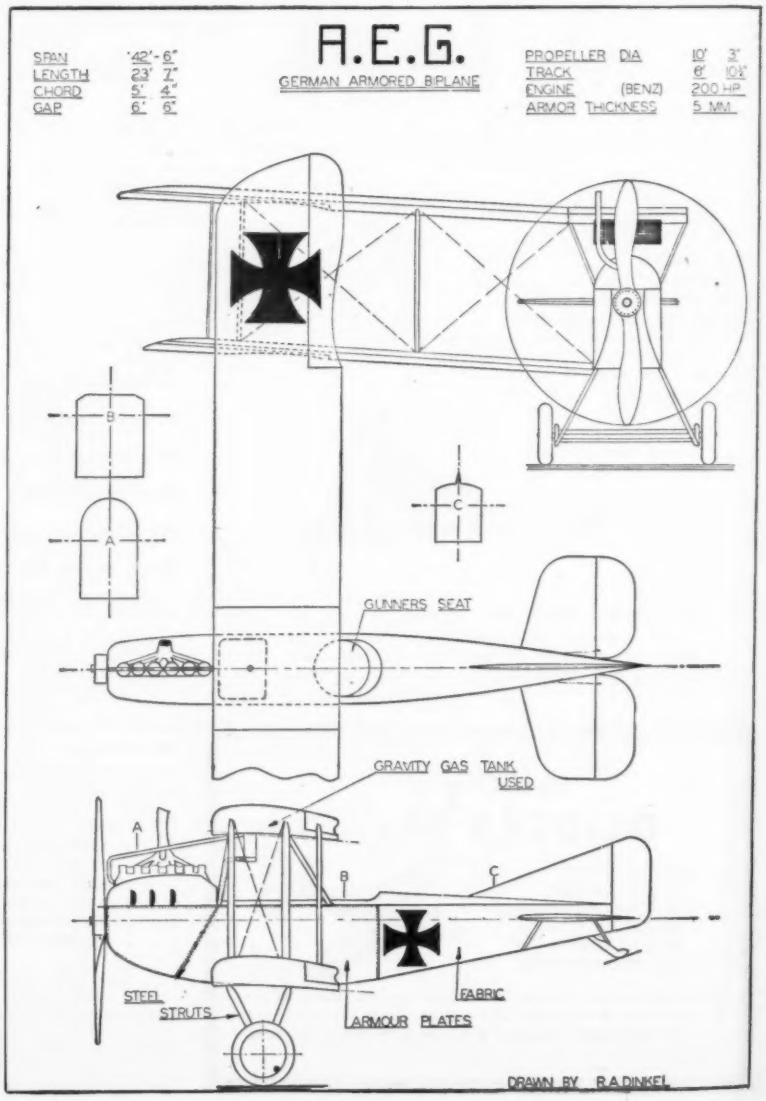
lowing method. A propeller of predetermined pitch and diameter was used. The static thrust was obtained in conjunction with a stroboscope. The relative amount of static thrust was plotted against rate of time and converted into terms of hp. We then assumed a 20% loss of propeller efficiency, added the result to the static thrust, and the result was .160 hp."

Since the engine weight is stated to be 3.17 oz. and the displacement is .199 cu. in., the estimated hp per cu. in. of displacement is .804 and the weight per hp 1.24 lbs. It should be understood that this is the estimated power developed by the engine under the load imposed—that is, a propeller of a certain diameter and pitch. The engine may be capable of higher power at higher speeds. To illustrate this point, suppose one end of a string is wrapped around the crankshaft of an engine and a weight is attached to the other end. The engine will turn at a certain number of rpm and lift the weight at a certain linear speed. If the weight is then halved and the engine runs at twice the number of rpm, thus lifting the lighter weight twice as fast, the power will be the same. If, however, the engine proves capable of running more than twice the number of rpm, which is quite possible, it will lift the lighter weight more than twice as fast and the power will be greater. Starting with a high load the speed and power of an engine will increase as the load is gradually decreased until the point is reached where the engine is developing the maximum power of which it is capable. This point is the peak of hp curve plotted against rpm.

In large aircraft engines, reduction gears are used extensively to permit the engine to run at a higher speed than would be efficient for the propeller. For model engines little consideration seems to have been given reduction gear use.

The Elf Engine Co. states that dynamometer tests of Elf engines are not made because of the difficulty in duplicating working conditions. For purposes of comparison, engines are checked by means of propeller thrust. The Elf Single turns a 9" propeller about 8,000 rpm and develops 17 oz. thrust. The Twin turns a 9.6" propeller about 8,000 rpm and develops 35 oz. thrust. The Four turns a 13" propeller about 7,800 rpm and develops 65 oz. thrust.



Design Forum

(Continued from page 34)

So, required flying characteristics, whether related to performance or balance, determine the form, proportions and structure of the aircraft. The structure must be built so the flight forces are of certain definite values to give the required performance and operate in coordination with one another to provide proper balance and control the aircraft at all times.

Naturally, young embryo designers can't swallow this whole pill at one time even though it may be sugar coated. Knowledge of airplane design must come gradually and grow with experience. Often the first step is to draw pictures of aircraft you believe embody unusual flying, structural or serviceable features. This column is created to present ideas of readers relative to airplane design so that all may profit from an exchange of ideas and criticism for or against the ideas presented.

We received drawings and general specifications for an unusual twin jet engine fighter from Ted Smith, Huckleberry Hill Rd., Unionville, Conn. A perspective view of this ship is shown here. He classifies it as a low altitude anti-personnel strafer and light bomber tank destroyer; also low altitude fighter useful for destroying light fortifications, planes on the ground, personnel, tanks, trains, etc. It has speed in excess of 500 mph, the high speed being the only protection from diving enemy fighters while strafing.

He specifies it as embodying the following features: two jet engines, a thick center wing panel for strength, armament and bombs, bullet-proof removable plexiglas covers to pilot compartment at the wing center, in which the pilot and bombardier lie prone, high aspect ratio outer wing panels, bombs to be carried in the thick center wing section, together with ten 20 mm cannons, three point retractable landing gear, a rudder at the base of the tail boom just rearward of the crew's nacelle, a single boom extending rearward to hold the stabilizer with two small vertical fins at its tail.

The aerodynamic efficiency of this ship is excellent. The thick center wing section provides plenty of space for the necessary load yet it provides greater lift compared to drag than most ships which require fuselages for this purpose. This is called the Burnelli type wing. The motors provide less drag when they are mounted on this form of wing than on thin wings because most of the crosssectional area of the nacelles is encompassed by the thick wing section. The sleek lines of the thin tail boom and stabilizer also contribute to the low drag characteristic of the airplane.

Aerodynamically, without other consideration, this is an efficient airplane. However, let us consider what it was designed for. Essentially it is a low altitude, high speed fighter and light bomber. How do its general lines contribute to this objective? First of all, at speeds of 500 mph or more, thin specially designed and sharp nose wing sections are imperative. Heavy rounded nose sections create considerable compressibility producing enormous resistance at high speed. Consequently, the thick center wing section with rounded leading edge is unsuitable for the performance required. It should be modified so the leading edge is quite sharp and its contours should take the form of the laminar flow wing section. This section has the highest point of the curve quite far back from the leading edge with its trailing edge clipped off abruptly. The high aspect ratio of this ship will give rapid climb. This is not essential in a low altitude fighter and speed might be increased by reducing the wingspan slightly.

The second consideration is the use of jet motors. Jet motors are very efficient at high speeds and especially at high altitudes. However, this is a low altitude ship. Also, when ground strafing and in other low altitude military missions, speeds above 400 mph make it nearly impossible to carry out its mission efficiently. It is true that on other occasions when you wish to escape from the enemy high speed is essential, but the prime purpose is not to evade but to destroy military objectives on the ground. If the plane is exceedingly fast near the ground it has little time to concentrate gunfire on objects before it is past the point of range. On such missions planes must slow down to a certain extent so as to keep the target within the gun sights long enough for the guns to take effect. At 250 mph twice as many shots can be fired at a target as at 500 mph. So we see that this plane should have a considerable range of speed, not only high speed. This requirement makes jet motors impractical because they are efficient only at high speeds, providing little speed range. It would be much better to install engines with controllable pitch propellers. The jet motor featured would be excellent for high altitude fighters.

Next let us consider the balance of this aircraft. One of the most important points is the movement of the center of pressure. With wide cord wings such as the center section the c.p. movement is comparatively large. At high speed it has been shown in tests on this type of ship that the center section lifts at least 90% of the load, the outer wing panels carry very little. Consequently 90% of the load is subject to a large movement of the c.p. Mr. Smith has not taken the usual precautions to reduce this. When large wing center sections are used it is common to sweep back the end wing panels considerably and place them at a smaller angle of attack than the center section. Consequently, when the plane noses up and the c.p. of the center section moves forward the wing tips increase their lift in greater proportion to the center of the wing. These being swept backward and having their point of lift rearward of the center of gravity of the airplane tends to increase the lift to the rear of the c.g., thereby compensating for the forward movement of the center section lift. In other words, when the tip wings are swept backward and set at an angle less than the center section their effect tends to reduce the c.p. movement. This helps to stabilize the ship longitudinally.

With the wings swept forward as shown in the drawing, the plane would be unstable in this sense. The broad span, on the other hand, gives excellent lateral control to overcome the spanwise distribution of the weight. The directional balance about the vertical axis is liable to be critical because of the lack of fin area. You will note that the fins are excessively small and would be insufficient to keep the airplane on a steady course. Should this ship start spinning the fins are not large enough to create any dampening effect that might retard or stop it.

Directional control also is insufficient with the rudder at the base of the boom and immediately above the rear end of the center nacelle. A ship with distrib-

(Turn to page 56)

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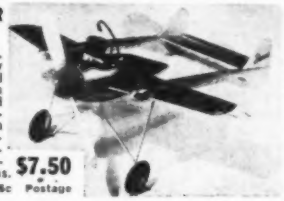

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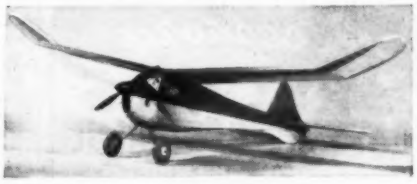

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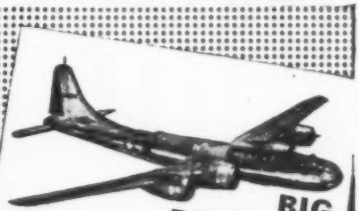

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uted loads and with the two motors far from the c.g. requires large turning moments. A rudder in this position and of the small size indicated would have no noticeable effect whatsoever. The addition of the tabs on the small fins would contribute very little. The fin and rudder area for this type of ship should be at least six times as large as indicated and three times as far rearward of the c.g. The directional effect of these surfaces on any airplane is measured by the production of the fin and rudder area times their distance from the c.g. In this case the fin and rudder area is approximately 3 x 6 or 1/18th the size required.

Now let us consider the structural design. As stated, the center section nacelle and outer wing panels are structurally excellent in this combination. The thick center section allows a distributed load and space to carry this load. With the loads distributed in this manner a lighter structure results. Concentrated loads create greater bending moments and strain.

Consider the tail, which seems to be a unique feature. If it were possible to build a sufficiently strong tail with such a design it would be excellent. However, apparently insufficient thought and study has been given to the structure required to carry tail stresses. These are extremely large on a load-carrying high speed plane and any change in direction would cause tremendous stress in the tail boom. For instance, if the plane is suddenly rolled sideways the stabilizer would tend to remain in its former position due to its inertia and air pressures upon it, thereby causing great torsional stress in the tail boom. If the ship nosed up quickly great pressures would be exerted on the horizontal tail surfaces putting great bending stress on the boom. If these two maneuvers are combined, the result is a blend of torsional and bending stress on the boom. Even though the boom is strong enough to withstand these stresses the flexure would be so great that the angle of the tail surfaces relative to the forward part of the ship would be excessive and intolerable. Unless this boom is constructed of solid steel, or nearly so, it would be unable to carry the tail loads and even then it would be extremely doubtful.

Also, with the tail supported at its center as shown, excessive stresses would be created in the horizontal stabilizer. To carry these tail loads successfully with a light structure two booms should be used, each being deep where it joins the forward part of the ship and tapering in depth toward the stabilizer. If desired their thickness can be the same throughout the length. It would allow a lighter stabilizer structure, less tail weight, and consequently more centralized weights because the heavier the tail the farther the engines must be moved forward to balance it. This moves the centers of individual weights farther from the c.g. which is to be avoided.

You can imagine how this thin tail boom would bend when the elevators were raised for a climb. Tremendous pressures on the tail are created and would bend the boom downward if it did not snap it off. With fins of correct size this boom would not only have to support considerable weight not indicated here but would have to take the side thrust of the rudders. Consequently we have in this ship a combination of excellent yet misapplied ideas, individually excellent but combined in such a manner that they would not operate to give the performance or strength required of this type of aircraft. Incidentally, no space has

been allowed for fuel tanks in the design or specifications.

* *

Clifford Mohr of 2633 Flower St., Huntington Park, Calif., sends a design of a single seater shown on page 00. He does not state what this airplane is to be used for. We can only judge it to be a fighter from its general design. He says it carries a 2000 hp engine with the unique cooling feature of a crankshaft fan rearward of the opening around the spinner. For high altitude action a mechanism resembling a Fowler flap enlarges the control surfaces to make the plane more sensitive to control movement in rarefied air.

Other features are: oil radiators in the wings, two 20 mm cannon and four .50 cal. machine guns. This is as much data as he gives outside of the drawing so we can only judge the merits of this ship from its general contour. However, it is well streamlined, with inverted gull wings that have proven excellent. The cockpit possibly is a little high and not slanted sufficiently forward of the pilot.

The first general characteristic noted is the low aspect ratio of approximately 4 to 4½. Since Mr. Mohr indicates it is for high altitude work this is a very poor feature. High altitude planes require a comparatively large aspect ratio. Low aspect ratio also gives poor climb, and if this airplane were able to reach high altitude it would take more time to get there than a plane with more span and less chord.

The wings shown here are of a type used on dive bombers and ship board fighters. Dive bombers require exceedingly strong wings that will withstand the strain of dives without flutter. This requires comparatively stubby wings; also short span wings are of great advantage on carriers where space is at a premium. Consequently, we have a ship intended for one purpose whose design is inefficient for that purpose but suitable for another.

Another feature is the position of tail surfaces, especially the fin and rudder, the latter well in the wash of the air passing over the cockpit and rear part of the fuselage, so they are acting in disturbed air. In tests of ships of similar design it has been shown that often vertical tail surfaces are completely blanketed and have no effect whatsoever at high speeds. In other words, they are acting in turbulent air or no air at all due to the structure immediately in front.

To make them effective, they should be raised a distance equal to approximately half their height, indicated in the drawing. The upper contour of the fuselage to the rear of the cockpit should be horizontal and not slanted downwards. The fin should extend upward from this line. This will place the vertical surfaces in comparatively undisturbed air, insuring their effectiveness. To do this the lower contour of the fuselage rearward of the wing and stabilizer should also be raised. This again will give improved stabilizer effect, bringing it well upward out of the downwash of the wings. In large chord wings of this type, where the trailing edge is comparatively near the stabilizer, it is essential that the stabilizer be placed high to overcome interference.

The armament appears logical. Enlargement of the control surfaces is unique indeed but impractical when used with this type of wing where high altitude could not be attained. Unquestionably this ship would be very fast, and with higher aspect ratio wings and the other changes suggested would prove to be an excellent design.

World War I

(Continued from page 17)

similarly fixed. A main fuel tank of 45 gal. capacity was located under the pilot's seat. An instrument panel immediately in front of the pilot held a compass, altimeter, tachometer, air speed indicator, electric lighting set, starting magneto, oil pressure gage, air pressure gage, thermometer, watch, bank and turn indicator, and fuel gage. Controls included a Rolls Royce doping pump, ignition switches, radiator shutter lever, and tail plane incidence adjusting lever.

On the sheet aluminum cowl in front of the pilot an Aldis Telescopic and ring and bead sight were mounted. Pilot's armament consisted of one Vickers synchronized machine gun mounted on the vertical centerline of the ship directly in front of him. Totally enclosed, the gun fired through a blast tube which exited through a hole in the header tank built into the radiator shell. The rear portion of the Vickers' barrel was surrounded by a four gal. oil tank shaped to the fuselage crossection at that point and located 2' forward of the instrument panel. The Vickers gun itself was mounted on two tubular steel arcs, ends of which were attached to the upper longerons.

The observer's cockpit was fitted with an adjustable and folding seat which could be put out of the way to allow freedom during an engagement. Either one or two Lewis free-firing machine guns were mounted on a Scarff ring surrounding the observer's cockpit. Four extra ammunition drums for the Lewis guns were stowed in racks in the observer's position.

The control system was of the conventional stick and rudder bar type. The observer was fitted with a complete set of dual controls, except that the rudder bar was replaced by two hand grips fitted to the rudder cables where they passed through his cockpit. Elevator controls were actuated by a double horn on either side of the fuselage, attached to a torque tube which in turn was connected to the joy stick base.

Aileron control cables, attached to a quadrant on the joy stick base, ran through the lower center section, through the lower wing to connect upper and lower ailerons on both sides and continued through the upper wing and center section. The continuous cable was led by pulleys within the structures.

Bristol F2-B engine section varied from 190 to 280 hp, depending on the job expected of the plane and its date of manufacture. Engines fitted were the Rolls Royce 190 and 280 hp, Hispano Suiza 200 hp, BHP 200 hp, Sunbeam Arab 200 hp, and the BHP 300 hp, experimentally. The car type radiator was generally oval in shape. Some radiators were straight honeycomb type, others were equipped with shutters. The variety of engine modifications and uses to which the airplane was put make it impossible to set down definite rules as to radiator fitments.

Landing gear was made of a right and left "V" of steel tubing fitted on the trailing edge with a wooden streamline wrapped to the tubes with pinked tape and heavily doped. Axle and spreader bar were mounted in steel guides to limit their travel and were sprung on rubber shock cord. The spreader bar, like the struts, was faired with a wooden trailing edge. To support the underslung rudder off the ground, a quadruped tail skid structure of steel tubes was used to brace an otherwise conventional tail skid. A heavy coil spring absorbed the shock.

Bristol Fighter Surfaces

The F2-B empennage, mentioned previously, was mounted low to give the gunner a wide field of fire. Vertical members consisted of the split upper and lower fins and a one-piece rudder. Framework of each member consisted of wood ribs, spars and outline, with steel fittings. Fin area was 10.7 sq. ft. while rudder area totalled 7.2 sq. ft. Fins were mounted to the fuselage by steel clips bolted to reinforced members of the fuselage and wire-braced to the horizontal stabilizer.

The stabilizer had a maximum span of 13' 3" and a chord of 21". Its structure consisted of a main spar at the hinge line, 10 spruce ribs and the leading edge. Elevator was of the split, two-piece type with a maximum span of 13' 10" and a chord of 28". It was composed of a hinge line main spar, 10 ribs connected by an intercostal midway between the spar and trailing edge, and the outline members. Control horns were mounted directly to the reinforced fourth rib from the tip. Tail plane area totaled 45.4 sq. ft.

Longitudinal trim was accomplished through adjusting the stabilizer by means of a ratchet handle in the pilot's cockpit and a series of cables and quadrants. Normal setting was -½" to -¾" depending on the engine and load carried.

Main planes consisted of four identical panels (except for fittings) and two center sections, giving a total of 405 sq. ft. Each panel had a span of 17' 6" and consisted of two spars and 14 ribs, mounted on 15" centers. Two false ribs between each full rib extended from leading edge to rear of the front spar. Full ribs were made of nose, middle and trailing edge webs, stamped from plywood, tacked to the spars and fitted with spruce cap strips. Two stringers, upper and lower, ran the length of each panel equadistant between the two spars. Internal structure included 5 steel tube compression members in each panel between the spars to which steel bracing wires were attached. Chord of each wing was 5' 6" except at the center section which was just 48".

Ailerons with a span of 7' 5" and 24" chord were fitted to both upper and lower panels. They hinged directly to the main panel rear spar and consisted of a hinge spar, 6 plywood ribs and a spanwise stiffener.

Upper and lower center sections were identical except for fittings for their purpose. Upper center section on later models carried two small reserve fuel tanks. Lower center section contained fittings necessary for attachments such as struts, wind driven generator, bomb racks, and landing gear.

Both planes were rigged to a dihedral of 3½°. Gap on all models was 5' 5". Stagger on early 190 hp models was 17". This was increased to 18" on ship serials A.7177 and B.1101 constructed July 9, 1917 and subsequently. Increased stagger was brought about by installation of the 280 hp Rolls Royce motor on that date and consisted of moving the upper wing forward. When the Hispano Suiza 200 hp motor was fitted, stagger was increased to 19¾" by moving the lower wing to the rear. Where the incidence in all other models was 1¾° throughout, the Hispano Suiza model required precisely 1° 42 min. at the center section, 1° 24 min. at the inner struts and 1° at the outer struts.

Lower center section was supported from the bottom of the fuselage by a series of tubular steel struts and tie rods,

(Turn to page 60)

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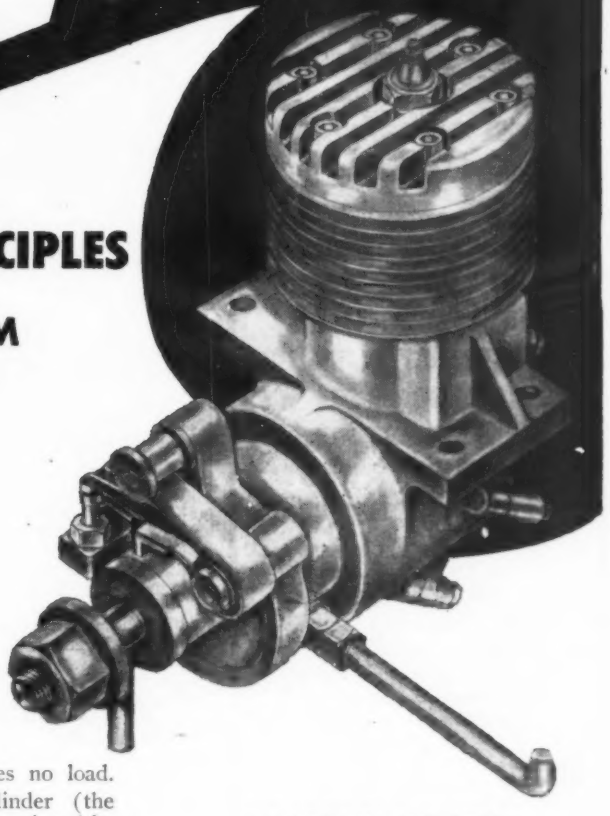

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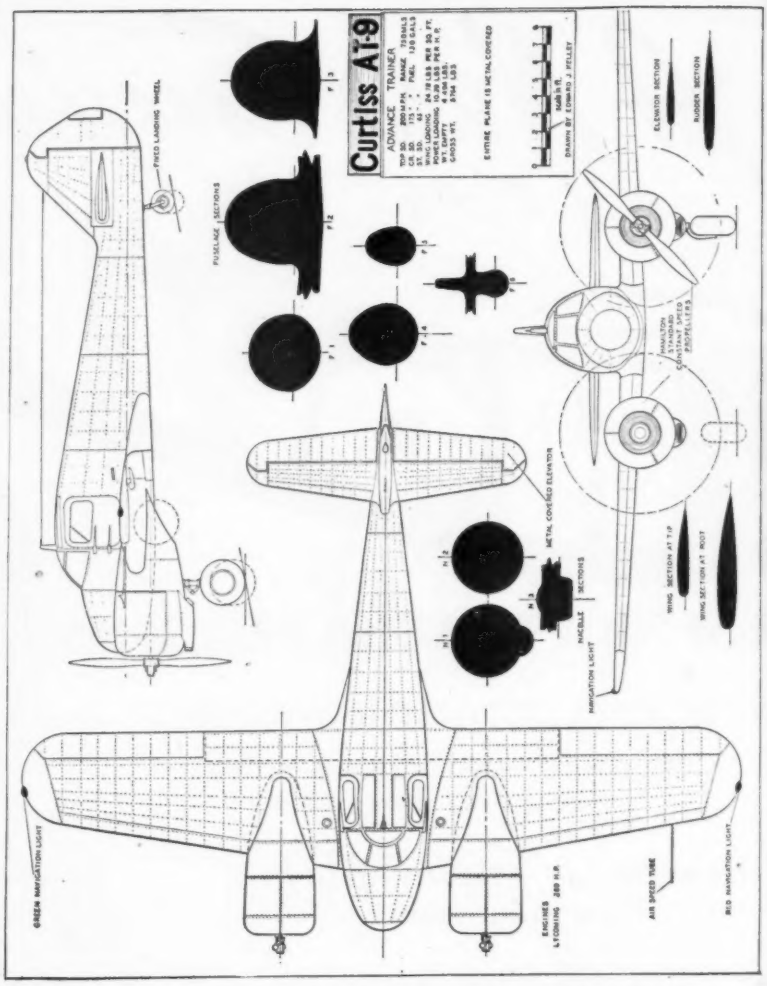


while the upper center section was attached by streamlined steel tubes. Interplane struts were streamline shaped from solid spruce. Spanwise slots in strut bases slipped over wing fittings and received transverse bolts to hold them in place. Strut ends were then taped and doped to prevent splitting.

The biplane cellule was completely rigged with solid steel streamlined RAF wires which included the usual lift, drag and landing components. Steel tubing skids were fitted under each lower panel beneath the outer interplane struts.

Bristol Fighter Performance

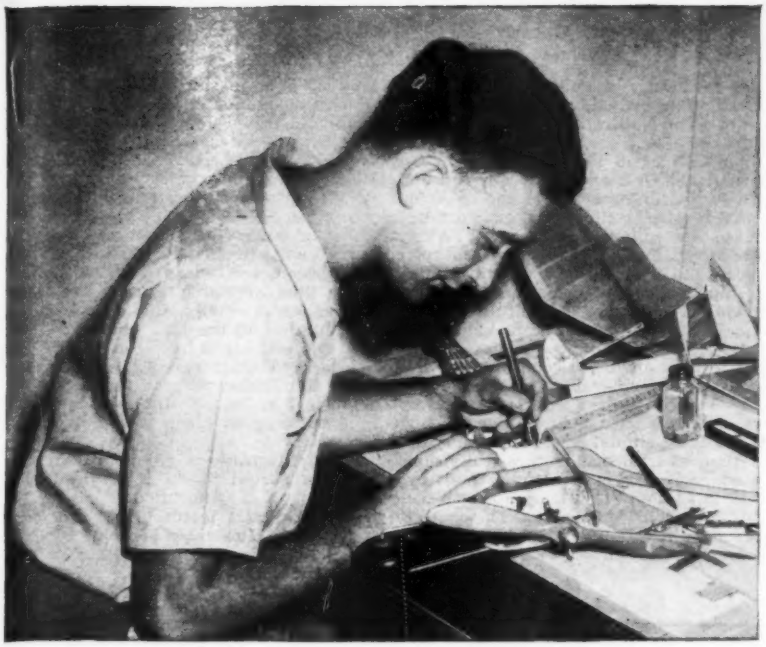
Empty weight of the 190 hp Bristol F2-B was 1700 lbs. including guns and mountings. Military load, 150 lbs.; crew, 350 lbs.; full tanks of fuel, oil and water, 440 lbs. brought the fighting weight to 2650 lbs. The 280 hp model, on the other hand, had an empty weight of 1850 lbs. with guns; military load of 150 lbs.; crew, 360 lbs.; plus 440 lbs. in fuel, oil and water, giving a weight load of 2800 lbs. Wing loading of the latter model was 6.92 lbs. sq. ft., and power loading 10.6 lbs. hp.

Performance figures for the 280 hp model only are available. High speed at sea level was 125.7 mph; at 5000 ft. 122.3 mph; and at 10,000 ft. 113.4 mph. Landing speed at sea level was 47.9 mph. Climb to 6000 ft. consumed 5.25 min., 10,000 ft. was reached in 11.5 min., and 15,000 ft. in 21.5 min. Ceiling of the 280 hp F2-B was 22,000 ft, stalling speed 50 hph, full throttle range 270 miles.

The F2-B was probably the only two seater built during the First World War that handled like a single seater and could be used as one. It was extremely maneuverable and as fast as the Fokker D.VII, generally regarded as one of the best German all-around performers. At the same time, the F2-B was staunch enough to dogfight vigorously. These features made it possible for such pilots as Capt. Andrew McKeever of No. 22 Squadron RFC to gain 23 of his 30 victories while flying a Bristol Fighter. And McKeever had only one eye!

Consider, too, Italy's greatest World War I ace, Maj. Francesco Baracca, who gained 34 victories before he was killed on a long range bombing mission flying an Italian Ansaldo S.V.A. Baracca used the features of the "Brief" to good advantage until his observer, of whom he was very fond, was killed. Thereafter, until his final fatal flight in an S.V.A., Baracca flew his F2-B as a single seater making up his gunner's weight with bombs and extra ammunition.

Of such things are airplanes and pilots made: good design, good construction, skill and courage. Unquestionably the finest active two seater constructed by any nation during the First World War, the Bristol Fighter F2-B has earned itself a permanent niche in aviation's Hall of Fame, just as its pilots living and dead staked their lives against the best the Germans had to offer—and won!



HIS PLANES WIN PRIZES— HE MAKES THEM WITH X-ACTO!

"Most Useful Tool in Modelmaker's Workshop," Says Brilliant Young Designer

Model plane fans know Martin Powell. His original designs have been written up in the leading magazines. His models have been used for display and instruction purposes by Air Youth of America. He's won prizes with everything from elementary "R. O. G.'s" to complex gas models.

Here you see him, working on his newest design. And you notice he's using an X-acto Knife. He says he doesn't see how any modelmaker can get along without an X-acto. He likes its scalpel-keen edge, the variety of interchangeable blade shapes. With X-acto, you can get true accuracy in even the smallest detail. *"Most useful tool in a modelmaker's workshop!"* That's what this young expert calls X-acto Knives.

PARENTS PLEASE NOTE! As a teacher of craft classes for young children (aged 8 to 12), Mr. Powell found the razor blades they'd been using meant cut fingers and too much spoilage. "X-acto Knives were the answer to that," he says. "The firm-grip handles permitted the children to carve safely, and turn out better work. That means a lot more fun!"

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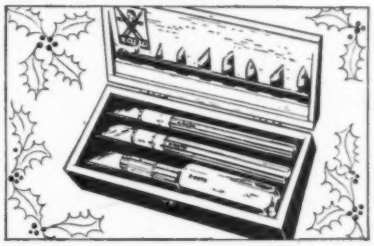

X-acto Knife Chest. 3 X-acto Knives with complete assortment of extra blades, each neatly assigned to its special slot in a handy wooden chest. $3.50 complete. No. 83 De Luxe All-Metal Knife Chest with 20 extra blades, $5.

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MODELS MAKE FINE GIFTS. Borrow the Bright Idea of Stanley C— of New Rochelle. He makes model planes with his X-acto Knife, to give to his friends for Christmas. And do they make a hit! Yours would too.

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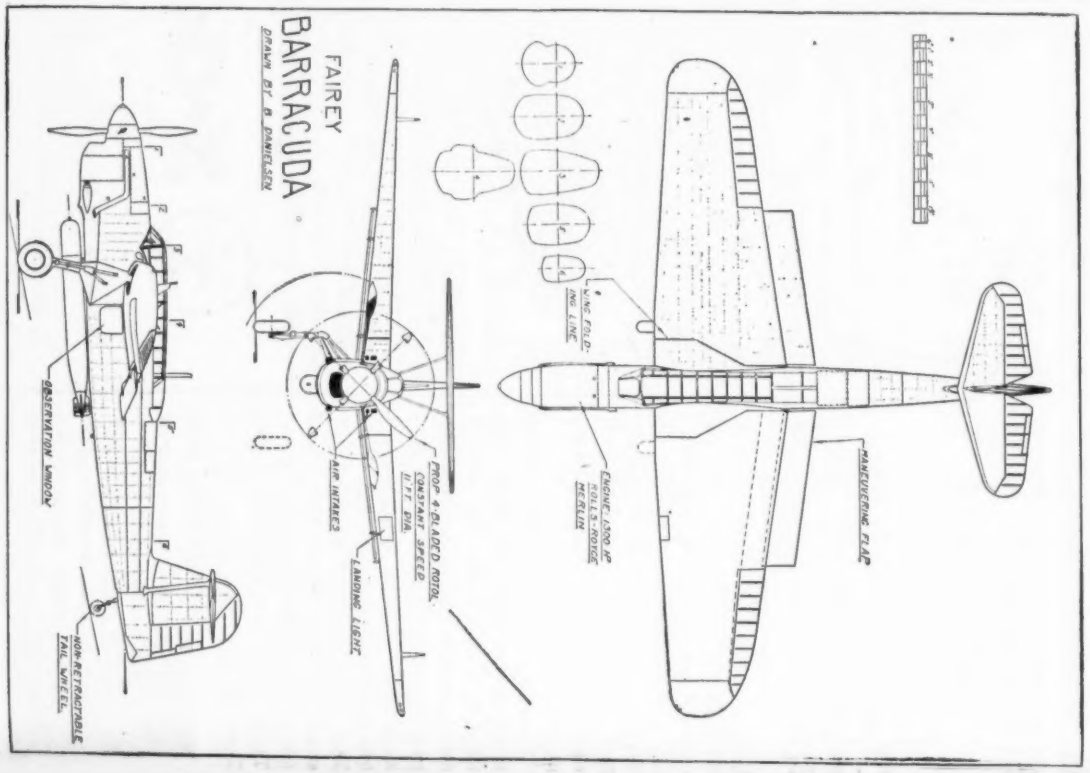

Airways

(*Continued from page 27*)

No. 4 shows a gas model of a *Great Lakes Trainer* owned by Cedric E. Galloway of 1710 N. Brighton St., Burbank, Calif. Scale is 1" to 1' giving a wingspan of 26.8", and the model is painted International Orange and Cream rubbed down to a high gloss just as the original plane. It also contains special details such as faired struts and lower wing panel faired into fuselage, front cockpit covered and even seats a dummy pilot. The ship weighs 2 lbs., is powered with an *Ohlsson* 23 and flies beautifully at 45 mph. Each year the aircraft industries around Burbank donate tropies for a Model Airplane Contest sponsored by the Parks and Playgrounds of the San Fernando Valley. It is a scale contest for boys and girls from 6 to 16 years. This was the third annual contest, and for the first time as a special feature a division was added for flying gas models built by the 17 to 70 boys. Cedric won first place hands down with his *Trainer*. The contest was judged for design, workmanship and finish. This beautiful gassie is an exact copy of a large ship of the same type which the builder once owned and flew.

Our old friend Joe S. Ortner, Victoria 1512, Buenos Aires, Argentina sent in No. 5 depicting his *Bulldozer* built from M.A.N. plans and powered with an *Ohlsson* 23. Joe says every time the model points her nose to the sky she seems more and more eager to get up there in a hurry, and then once the 23 stops screaming it becomes very lazy-daisy on the way down thus obtaining a nice cushioned landing. Incidentally, the *Zipper* model that Joe lost at the 1st National Contest just before it began has been found. The Sherlock who discovered it was a farmer living 20 miles away from its take-off. It flew for 1 hr. and 30 min., which is real time whether we clock it in S.A. or the U.S.A.

No. 6 illustrates a Douglas *Dauntless* built by Alfred Slack, P. O. Box 234, Paterson, N.J. The model has a 31" wingspread and features movable controls plus a retractable landing gear. Al

(*Turn to page 64*)

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concentrated on appearance; nevertheless he informs us the model does fly pretty well though she won't break any records. Rest easy, Al, she's a "honey."

The *Buccaneer* C Special featured in No. 7 was constructed by D. J. Andrew, 5128 S. Delaware, Tulsa, Okla. He assembled it from a kit and incorporated 50% balsa and 50% pine. The model is powered with a *Bunch Tiger* and although no record breaker turns in consistently good flights. Well, that's a lot more than some record breakers can boast about.

No. 8 is a free flight gas model designed and built by Bud Johnson of 1010 Ivan Ave., Rosemead, Calif. who writes: "The ship is powered by an *Ohlsson 19* and is very small in proportion to other gas models with the same size motor. Wingspan is 32" with an 8" chord, distance between the t.e. of the wing and the l.e. of the stabilizer being only 3". The fuselage measures 19" from the front of the firewall to tip of the tail. An eliptical wing employs a Davis airfoil with sheet covered l.e. and cap strips. One unique thing about the ship is the fact that it has no landing gear, coming in on the sheet covered belly which is reinforced with a plywood keel. A landing gear could be used, however."

David Norton of Toronto, Canada is shown in No. 9 holding his winner of the Class B U-Control speed event at a recent contest held at Hamilton. Dave designed the ship and powered it with a *Hurrican 24*.

The *Baby V Shark* featured in No. 10 was constructed entirely of balsa. Stanley P. Higgins of 3312 Descanso Drive, Los Angeles, Calif., is the proud builder who writes: "The fuselage was covered with 1/16 sheet balsa as was the wing. A woman's rayon stocking was stretched over the wing and doped on for added strength. The result was a model so strong it has survived every crackup including some power dives into a concrete runway without ever requiring a lick of repairs. However, the additional weight has proved too much for its *O & R 23* and flights are slow and sluggish. I intend mounting a *Forster 29* in it as soon as I get settled in this part of the country. Note the tire patches on the airwheels." That's a new and novel use for stockings, Stan, but overdoing it may provoke feminine friends and relatives!

No. 11 shows Joe Ortner's *Bulldozer* again—this time in a different position. We don't know which we like better, Joe, they both look pretty keen.

Pierre Maes of the Ghent Recreation Aircraft, Savaanstraat, 1, Ghent, Belgium sent us a very newsy letter and enclosed No. 12 which illustrates an original model built by his friend Romain Van Anche. The ship is called the *Skykisser*—but let's hear what Pierre says: "Well, I'm sure you will be happy to have news from modelers in Belgium now that the war has ceased. Of course, during the occupation it was absolutely forbidden to fly models, principally gas models. However, since the liberation we have formed many new clubs whose members build both gassies and gliders. Rubber powered jobs are prohibited due to lack of rubber, but we flew for four years with pre-war rubber which is quite a record. Our gassies are powered with old American engines and French motors, some even using Diesel motors. Many of our modelers are interested in jet propulsion and use it for gliders." Pierre is very interested in American model publications, construction views in general and news of contests held in the U.S.A. He would

more than welcome the opportunity to exchange magazines and correspondence with you fellows here, so come on boys get that pen in hand.

No. 13 is a beautiful built up scale of the *Mustang P-51* proudly displayed (with justification) by Paul Ebert, 109½ Broadway, Fargo, N.D. who writes: "By profession, I am a radio news editor—a job which these days leaves very little spare time for such things as model building. But over a span of some three months I managed to find an hour here and there to spend on the plane. It took a long time but after I finished the ship I figured it was well worth it. I used to make a lot of models while in school but when I left home 5 or 6 years ago to 'make my fortune' I had to stop; I was never in any one place long enough to get going on a model. I finally settled here and decided that 5 years was entirely too long to go without even whittling out a 6" solid. Because of space limitations my workshop, laboratory, bench and tool cabinet consisted of one 4' x 3' sheet of Celotex. When I got through working a session on the plane I had to clean up everything, make sure the model was well pinned down on the Celotex and then stand the whole works up against the wall and hope no one leaned on it. To top it off the Celotex developed a warp so that by the time I got to building the fuselage I was working on a concave surface. I was really surprised when the darn thing turned out straight as a die. The plane was built from a kit and has a span of 27". I intended originally to paint it silver but a couple of coats of silver over white tissue showed me that it would look pretty awful, so after 2 coats of clear and 2 of silver I piled on 2 coats of camouflage. It's lucky I didn't intend it for a flying model as it weighs so much it would take a gas engine to get it off the ground. As this is the first model I've laid a knife to in some five years I'm pretty proud of it, though I've seen many better models." Don't be so modest, Paul, the ship really is neat, and more important, it proves that once a modeler . . . always a modeler.

CLUB NEWS

California

The *East Bay Aeroneers Association* activities have been more along the "indoor" line lately (weather, boys?) and the fellows are really enjoying the contests held after the meetings. These varied contests are accomplishing a great deal because they provide the members with a lot of experience handling all types of models. Bob Mallory placed 1st and 2nd, and Jack Dyer 3rd in their latest microfilm contest. Winners of Junior and Senior classes in the last three contests were awarded handy sander sets. These useful little tools will act as an incentive for the boys to "build." Point standings at present are:

(1) Jack Dyer—710; (2) James Elliott—530; (3) Stan Stufflebeam—340.

A spot of trouble was encountered when the boys went shopping for a field in which to hold their free flight gas contest. For a while things looked pretty bad—Ocie Randall of the F.G.M.A. generously offered to loan Fresno Field; however, the Navy came through with permission for use of "Outlying Field."

An open meeting of Bay Area U-Control clubs was held for the purpose of forming an Association. The group met at the home of Clare Zimmerman of the *Airfoilers* with Roy Mayse as chairman. Eight clubs were represented and the

topic for discussion was the advisability of holding a contest monthly with the individual clubs alternating sponsorship. The organization would deal only with U-Control. Contests should be "open" (see our "Airways" editorial).

Heated arguments arose regarding the number of representatives to be present at future meetings. Some believed the meetings should be open to all interested, others wanted only two from each club. It was finally agreed that the initial meeting would be open to all who wish to attend; however, clubs will only be permitted two votes each regardless of total membership.

Incidentally, the U-Control boys gave the Oak Knoll fellows a fine show recently. Lee and Bud of the Hobby House in Berkeley arranged the program and brought a trailer load of fine young flyers and their ships. Bud flew a brand new ship—an *Ercoupe*. It was a bit touchy and gave the boys a big thrill when the engine cut while very high. Bud did a swell job of landing it without a crackup. Lee came out with a Jim Walker's whip control, powered with a *19*. The ship cracked up on the first attempt but after repairs were made it flew quite well. Roy Mayse did a lot of keen flying with his stunt ship which placed at the Santa Ana contest. Roy does everything in the book and does it with perfect ease. Fey Clark flew a nice *Fokker D-7* but the wind came up and ruined a perfect flight—the ship nosed over after landing and cracked a wing.

The *Junior Aeromodelers of N.A.S. Alameda* held their first "open contest." Although only recently organized the boys are to be congratulated on their spirit. To hold their first big contest "open" was a display of real sportsmanship since clubs of long standing still hesitate to open their contests to outsiders. The meet was held at Washington Park and the weather was calm which meant good flying.

The *Albany Control Flyers* had at least 50 entries at their monthly contest. Harold Heintz of Palo Alto carried off Class A stunt with a 23 biplane, while Roy Mayse took Class B. Some nice double flying was successful.

Monthly free flight contest by the *Fresno Gas Model Airplane Club* was almost doomed by a high wind which kept all but the most daring from participating. Results:

Class A—(1) Marshall; (2) Vincent; (3) Dunham.
Class B—(1) Dunham; (2) Balekian; (3) Johnson.
Class C—(1) James; (2) Farrar; (3) Randall.

These contests are held on the last Sunday of every month on the clubs' field—one mile west of Raisin City on Manning Ave. An exceptionally large turnout of glider boys made the monthly glider contest both lively and keenly competitive. The fellows are getting their gliders trimmed for the semi-annual contest to be held in December and lots of prizes are in store for the winners. The following scores were made in the latest contest:

Hand Launched—(1) Ray Balekian—253 sec's; (2) Ray Balekian—151.5 sec's; (3) Martin Martin—101.5 sec's.
Catapult—(1) Ray Balekian—393; (2) Henry Vincent—360; (3) M. Martin—287.
Tow-line—(1) Henry Vincent—498; (2) Bud Warner—385; (3) Ray Balekian—145.5.

Good news from Ocie Randall, editor of the *F.G.M.A.C. News*. It seems Ocie's son is soon to be discharged from the Navy after six years' service. "Bill" has been awarded the Presidential Citation and medal and we are all just as proud and happy about the whole thing as "Pop." Incidentally, an editorial from Ocie's paper states now that V-J Day has

arrived and gone there will be a clamor for a West Coast National and the *Los Angeles Club* has stated they will stage it one year from V-J Day. The *Fresno Club*, the *Oakland Aeroneers*, *Bakersfield*, *Lindsay* and other clubs have all thrown their weight towards L.A. for this big event. With the return of motors, and also war veterans wanting to fly again (we understand a great many of them are getting down their old models and dusting them off), the event promises to be as big as the Eastern Nationals.

Kansas

The Annual Kiwanis - YMCA Model Airplane Meet held at Wilson Field in Wichita was a huge success. Plans are under way to hold an even larger affair next year. It has even been suggested that since the war is now over one of the larger airfields might be utilized for next year's meet and the cement runways used for U-Control flying. Contestants numbering 119 signed in 241 planes for the two day affair. Eight committees worked on the contest and more than 10,000 spectators witnessed the event during which $750 in prizes was awarded. It took two companies of C.A.P. boys to handle the crowds and park the cars. Complete results:

Class A—(1) Bob Dyer; (2) C. O. Wright; (3) Jack Cordell.
Class B—(1) David Elliott; (2) Lt. J. Paysen; (3) Gene Seele.
Class C—(1) John Dean; (2) C. O. Wright; (3) Herb Phillips.
Sr. Rubber Powered Free Flight—(1) Lt. J. Paysen; (2) Laverne Koepsel; (3) D. G. Hamilton.
Jr. Rubber Powered Free Flight—(1) Dean Dunlap; (2) Tommy Smith.
Sr. Towline—(1) Stanley Swene; (2) Bob Bash; (3) Bill Bain.
Jr. Towline—(1) Rene Forrester.
Sr. Hand Launched—(1) Bill Eddy; (2) Calvin Sutterfield; (3) Lt. J. Paysen.
Jr. Hand Launched—(1) Bob Burright; (2) Bob Cook; (3) Junior Wahl.
Sr. Hi-Start—(1) Carl Unruh.
Jr. Hi-Start—(1) Stevens; (2) Rene Forrester; (3) Bob Braden.
Ornithopter—(1) David Elliott; (2) Bob Bash.

Russell Nichols of the A.M.A. in Washington congratulated the boys on the success of their meet, and Don Griffin, Pres. of the *Kansas City Sky Kings*, praised the efficient running and well-knit organization of the contest.

New York

A club which boasts a membership of 19 since its inception one year ago is the *Yonker's Gas Birds*. Meetings are held every Tuesday evening at the YMCA. Newly elected officers are Raymond McCoy, Pres.; Edward Delhos, Vice Pres.; John Elmo, Sec'y; and Benjamin Sokerka, Treas. A few new planes were designed by some members. A Class B flight model by George Kern and a U-Control A-B or C model by Pasquale Mastronarde show the greatest possibilities. The boys sent us a sample official membership card and it's pretty "swank," containing all the "fixings."

Pennsylvania

Allen Mackey was elected President and F. Stanley Jackson, Secretary of the newly organized club called the *Quarryville Hi - Flyers*. Although only one month old 24 members have already joined up. Their first contest was held at Reading recently and out of six entries made by the club five placed. The members wish to contact other clubs in their vicinity—object . . . competitive contests.

NEWS OF MODELERS

We have just received a letter from Dr. H. Charles of Merrion, Dublin, Eire who says in part: "Incidentally, you may be interested to know that since the petrol driven class was added to this

event (National) three years ago, a *Baby Cyclone* powered model took first place in both 1942 and 1943 and second place in 1944."

Sub/Lt. (A) A. E. Bailey, Mosstown Camp, R.N.A.S. Rattray, Aberdeenshire, Scotland spent several months in America last year as an aviation cadet and during that time formed an attachment to M.A.N. and other American aviation magazines. He is keenly desirous of maintaining liaison with American model matters now that he is back home and hopes that some of our readers may feel the same way about British papers, finding themselves in a position similar to his. The lieutenant says: "I would be eager to exchange both correspondence and British aeronautical books, for current issues of American model magazines, books and periodicals. Although the war is over we have not yet been advised as to our status and I am too busy to do any active modeling but am well versed in English aviation progress and could keep up an interesting correspondence with some of your readers with that in common." The bait offered is more than sufficient to catch some of our internationally minded young modelers, so start writing fellows!

A request from David H. Scrivener, Little Croft, Lee Grove, Chigwell, Essex, England reads: "I would like to contact a pen pal about 16 to 18 years of age who is interested in model and full scale aircraft. I am a keen member of the Air Training Corps and also an airplane spotter. I am mainly interested in rubber and glider models, especially gliders, owing to the shortage of rubber, but that doesn't mean that I'm not interested in gas and microfilm models. I have sent in a record claim form for the British Class A glider record with 42 min. 3 sec.—the glider being 4' span. The existing record was made in 1938 with 36 min. 31 sec. I have just come back from an R.A.F. Bomber Command Station where I completed training with the ATC. Aeromodeling has increased instead of decreased in this country despite the shortage of materials. Design has advanced tremendously during the war, especially in gliders. Chigwell is 12 miles N.E. of London and has had more than its share of bombs and rockets—in fact our area had 70% of the rockets and too many doodle-bugs for my liking; still . . . they are things of the past."

Sgt. E. C. Hoopengarner, 429th Bomb Sqd., 2nd Bomb Gp. APO 520 c/o PM, N.Y. writes: "While in Florence, Italy, attending the University Study Center, the G.I. College there, I came across the *Florence Model Airplane Club*. The President of the club—Giorgio Bonsi—and I have had many interesting conversations. The club has a very good setup, having an apartment in the center of town with a beautiful workshop. Their quantity of balsa and other supplies is quite limited but getting better now that the war is a thing of the past. The boys have successfully developed a model Diesel engine which is a great advancement toward model aeronautics. It is about the same size and weight of our average engine but requires no coil or batteries which will eliminate a lot of weight."

Pvt. George Kanakos, 85th Draft, Staging Unit, 16-B-12, Camp Pendelton, Calif. sent us notification of his present location and he says he is pleased at the way his *Gyrene* was handled in our October 1945 issue. George is more than proud to be a member of the Marine Corps and we'll bet they are just as proud of him.

* *

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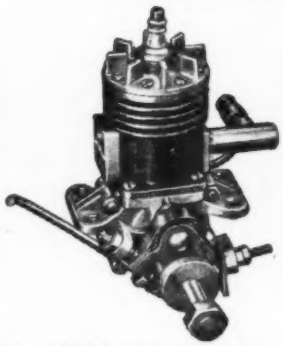

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R. D., Cotati, Cal.: About one year ago I purchased one of your G.H.Q. Motors. I am glad to tell you that the G.H.Q. motor is a very fine motor. I have been using it in a Super G Shark. In the past year we have been having many model airplane contests and I have won nearly every one with my Super G Shark powered by your G.H.Q. motor. My G.H.Q. motor has been giving me excellent service.

J. N., Breckenridge, Minn.: Am having good results from my motor.

E. D., Pleasant Hill, Mo.: Received my G.H.Q. motor in fine shape. Very well satisfied, and think it is a swell little motor, runs fine. A friend of mine wants one, too, so wanted me to order it for him.

C.C., South Hill, Va.: I bought a G.H.Q. engine from you last September and installed it in a six foot wingspan airplane. In engine performance, the engine you sold me passed with flying colors. I congratulate you on putting so much performance in my engine at so low a cost.

C. F., Pittsburgh, Pa.: My G.H.Q. engine has given very satisfactory service for several years now.

E. S. J., Tallahassee, Fla.: I have a G.H.Q. engine that I purchased from your company a short while ago and it operates satisfactorily.

N. L. B., New York, N. Y.: I received my G.H.Q. motor in fine shape. It runs swell, and I am sending another order to you.

M. B. H., Omaha, Nebr.: I think the G.H.Q. motor is the best motor I have ever seen.

A. Z., Texarkana, Tex.: I have had about seven of your motors in the past and think quite a lot about them.

R. D., Glen Allen, Va.: I started it with only a few turns of the propeller and was very pleased with it.

J. M., Arlington, Va.: I've had one of your motors for about three years now and it's still going strong.

C. L. N., Amarillo, Tex.: Before my induction into the Army I built a few models which incorporated your G.H.Q. motor. I found it satisfactory and put a great deal of faith into it because of its dependability.

B. D. J., San Francisco, Cal.: I already own one of your G.H.Q. engines and it performs like new.

D. B. R., Jr., Litchfield, Conn.: I purchased one of your engines a few years ago and it is still in working order. I have used it in boat models with great success. I am particularly impressed by its easy-starting qualities. These are very valuable in a boat, where it is more difficult to start an engine. Usually, only one attempt is needed once the engine has been primed. As a matter of fact, my G.H.Q. motor starts easier now than when I bought it. The motor has satisfied me very much.

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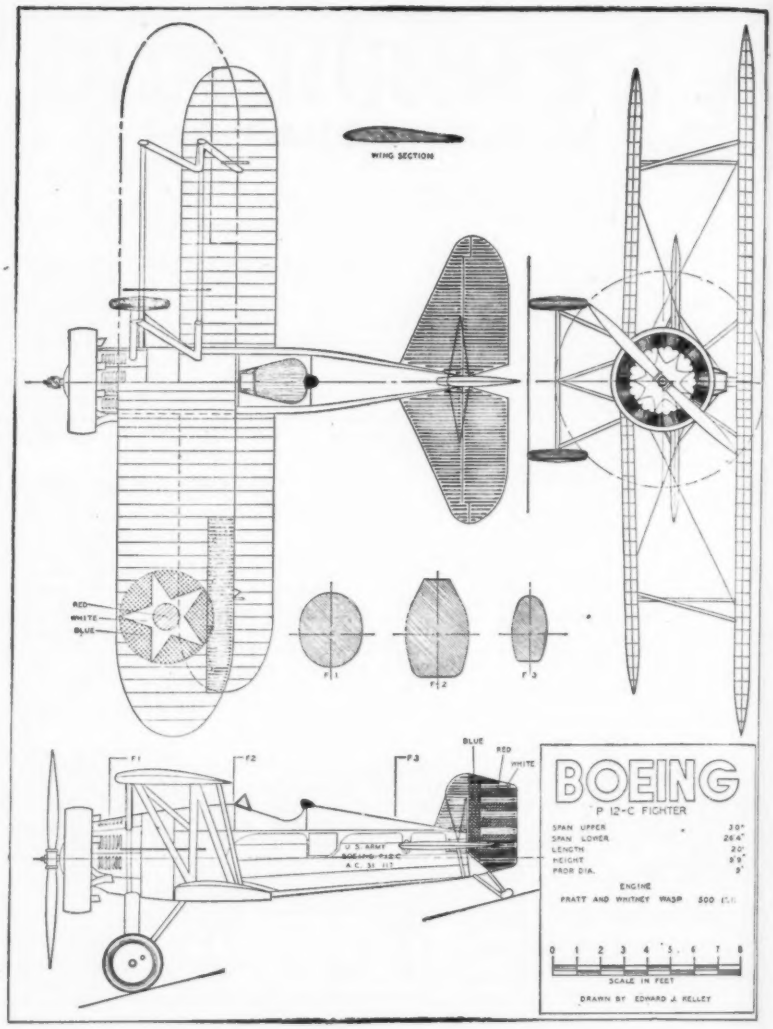

Lockheed P-80

(Continued from page 15)

out if wheels are retractable. Using the former patterns for A, A-1, B, M and L and a compass for C to H make two of each from 1/8 sheet balsa. Space X is also cut out of one each of the nose formers if you want to fold your wheels up. Now glue all the fuselage formers on to opposite sides of the balsa silhouette sheet, *except* C and D. These go on *after* the wings are mounted. A only is notched for 1/16 square hardwood stringers.

Wings of the original ship are laminar flow and quite thin. Hence, we made the wing section taper at front and rear with the thickest part just in front of the wing centerline. Use the W patterns and cut 2 each from 1/16 sheet, W7 from 1/4" stock. First cut and lay the spar over the plan. Glue on W1 and W6, then block up and glue the trailing and leading edges. Glue in the remaining ribs and use straight strips for midribs; these can be sanded to conform to rib pattern later. Fit in 1/8 square balsa between rib tops at spar, glue on W7, make hard balsa block J and glue in securely. Your wings are now ready for smoothing up and mounting on the fuselage sheet.

Mark the wing position accurately and glue wings on, blocking them up for correct dihedral before the glue dries. W1 may have to be cracked loose from leading and trailing edge to get it flat against fuselage sheet, but be sure they are firmly fastened. We went further and glued a section of flat balsa to both spars by cutting a hole in the center sheet thus making the wings doubly secure. Gusset inboard corners well.

Wheels are now affixed by bending spring wire and either hinging as shown or wrapping to spar and nearest rib. If hinged, be sure to gusset the hardwood strip at both ends. Wheel arm is a bent wire wrapped with fine wire to wheel strut and swung in the indicated arc when wheel is down. Here it is anchored between two 1/16 pine sheets fitted in area between hinge strip and W3. The two inboard sections and front half of the wings are now covered top and bottom with 1/32 sheet balsa. Wheel well door is hinged with tissue and a loose wire loop around strut and through door holds it in position. Front wheel is attached as shown on plan and must fit tightly in hole in hardwood braces glued to each side of center fuselage sheet.

At long last you put on Formers C and D and glue on the center stringer on both sides.

Now place the two top stringers and

(*Turn to page* 72)

P-S GLIDERS

THE ONLY MODEL GLIDERS DESIGNED LIKE REAL PLANES. *WIND TUNNEL TESTING* ASSURES YOU BETTER FLIGHTS, LONGER FLIGHTS AND MORE OF 'EM!

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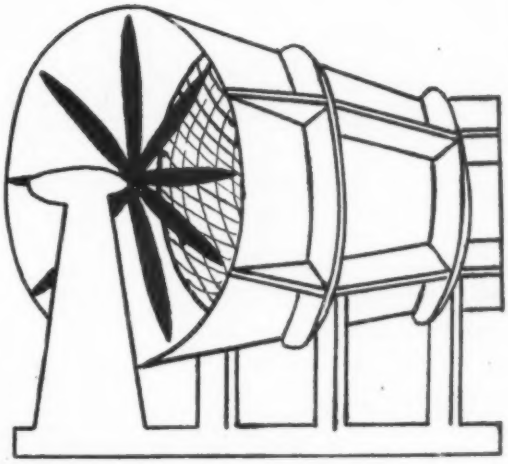

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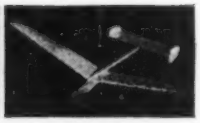

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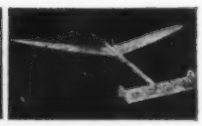
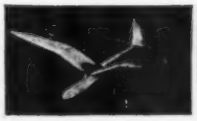
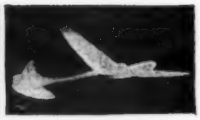


JOSIE



LENORE



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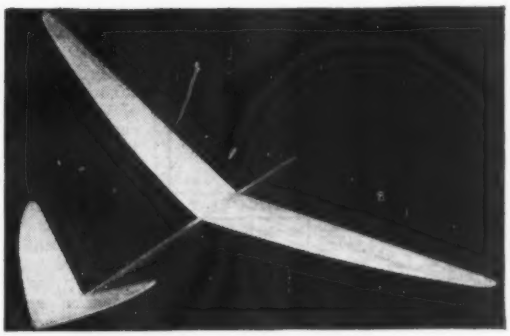
ROSEBUD

This model, illustrated at the right, comes to you with all parts cut to shape. Cambered wing for high lift—requires no finishing. A model of simple design but possessing proven high performance. Add the ROSEBUD to your fleet today!



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MODEL AIRPLANE NEWS

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glue on the tail surfaces checking them accurately to be sure they are true. The stabilizer must be parallel with centerline of the ship and the fin accurately squared up with it. Keep remembering that your P-80 is a fast flier, and don't allow any inaccurate mounting to cause trouble when she ascends. After the tail is mounted put in the elevator adjustment key and fasten top line to the tapered dowel with lower line tied securely to a rubberband under tension fastened in the cockpit space. Run lines through holes burned in the formers. The adjustment key in our model is in one corner of the wheel well, but if you use stationary landing gear the dowel will have to extend outside the fuselage bottom. Pulling the key down releases it and it turns freely; pushing up tightens and locks it.

Now finish putting on all stringers, being careful to get them evenly spaced, and your P-80 begins to look like an airplane. Fill in between stringers with short 1/16 balsa strips from nose to behind cockpit and at all areas where fillets meet the fuselage. Fit in solid nose blocks and carve to shape, sanding the whole ship to a smooth finish.

When this is done, add the two air intake ducts and wing fillets. The ducts require two formers, M and L glued on outside of fuselage with the rear one glued at an angle and flat to wing leading edge. Small tapered strips of 1/32 sheet balsa are fitted around them as shown in the accompanying sketch and a similar set is glued back to the wing fillet block. This takes patience but when finished and sanded carefully you've got streamlining you can really be proud of.

Cover completely and neatly with tissue using small pieces on the curved areas and cover planking to get a surface that can be finished to a high gloss. Use several coats of silver dope and sand between them until the whole ship glistens.

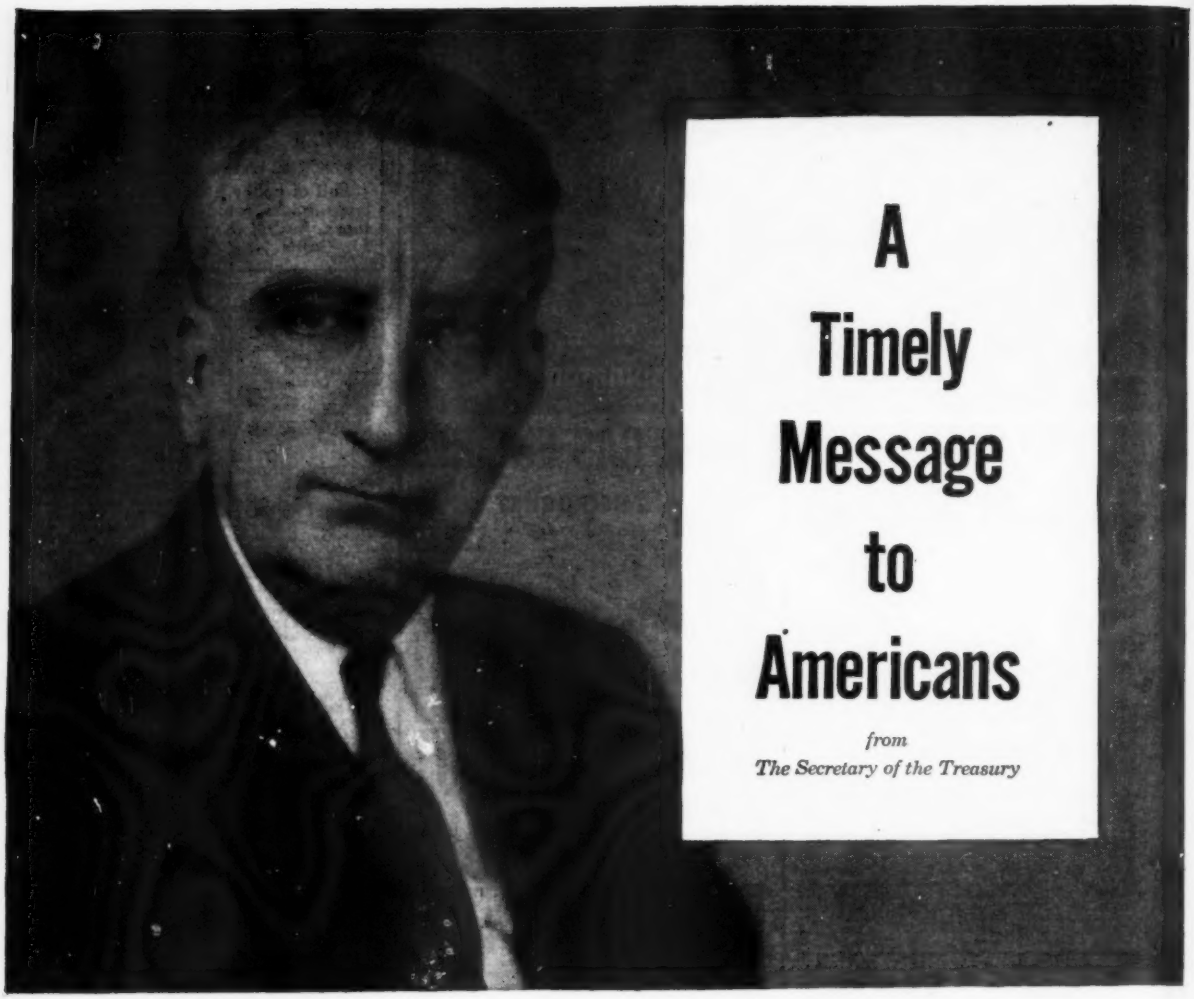
Make the two wing tanks from soft balsa using the patterns N with hollowed blocks, or turn on a high speed lathe. Fillet to lower wing surface and after doping and polishing glue in at wing tips with two small hardwood pegs extending into holes in W-7.

At this point you'll have to restrain yourself from test flying the model prematurely. Form a cockpit cover and glue it on after adding headrest and radio antenna details. Rule in the control surfaces and flaps and put in machine guns in the nose. (We used nails since a bit of weight is needed at the nose in the model built as shown here).

Flying comes next, and if you are careful to start with you'll enjoy many hours of watching your *Shooting Star* do some real flying. Check the elevator and set it first with a little positive angle. Securely tie on a strong fish line as this model exerts a healthy pull; and start swinging in a narrow circle so that should anything go wrong you can keep it clear of the ground. A diving tendency can be corrected with a little more lift on the elevator, or a stalling tendency with an opposite setting. Get it set for a good level flying angle and let your line out as you pour on the speed. When we tried it in a large open field we were amazed at the size of circle this P-80 would take and still soar and glide like a darting swallow.

What's more, you'll be amazed too at the ease with which is slows down and lands. Aerodynamically, you'll find this model P-80 a truly remarkable ship and one well worth your time to build and fly. Try one and see!

THE January 1946 issue of MODEL AIRPLANE NEWS will feature a type of airplane considered by some to be the only logical answer to the needs of the private flier—the amphibian. From the cover by Jo Kotula to the three-view and description of the latest model you can learn all about the new Republic *Seabee*.



A Timely Message to Americans

from
The Secretary of the Treasury

America has much to be thankful for.

Abroad we have overcome enemies whose strength not long ago sent a shudder of fear throughout the world.

At home we have checked an enemy that would have impaired our economy and our American way of life. That enemy was inflation—runaway prices.

The credit for this achievement, like the credit for military victory, belongs to the people.

You—the individual American citizen—have kept our economy strong in the face of the greatest inflationary threat this nation ever faced.

You did it by simple, everyday acts of good citizenship.

You put, on the average, nearly one-fourth of your income into War Bonds and other savings. The 85,000,000 owners of War Bonds not only helped pay the costs of war, but also contributed greatly to a stable, prosperous postwar nation.

You, the individual American citizen, also helped by cooperation with rationing, price and wage controls, by exercising restraint in your buying and by accepting high wartime taxes.

All those things relieved the pressure on prices.

THE TASK AHEAD

We now set our faces toward this future: a prosperous, stable postwar America—an America with jobs and an opportunity for all.

To achieve this we must steer a firm course between an inflationary price rise such as followed World War I and a deflation that might mean prolonged unemployment. Prices rose more sharply after the last war than they did during the conflict and paved the way for the depression that followed—a depression which meant unemployment, business failures and farm foreclosures for many.

Today *you* can help steer our course toward a prosperous America:

—by buying all the Victory Bonds you can afford *and by holding on to the War Bonds you now have*

—by cooperating with such price, rationing and other controls as may be necessary for a while longer

—by continuing to exercise patience and good sense with high faith in our future.

The challenge to America of switching from war to peace with a minimum of clashing gears is a big one.

But it is a small one compared to the tasks this nation has accomplished since Sunday, December 7, 1941.

Fred M. Vinson
Secretary of the Treasury

A Government message prepared by the War Advertising Council and contributed by this magazine in cooperation with the Magazine Publishers of America.

Plane on the Cover

(Continued from page 20)

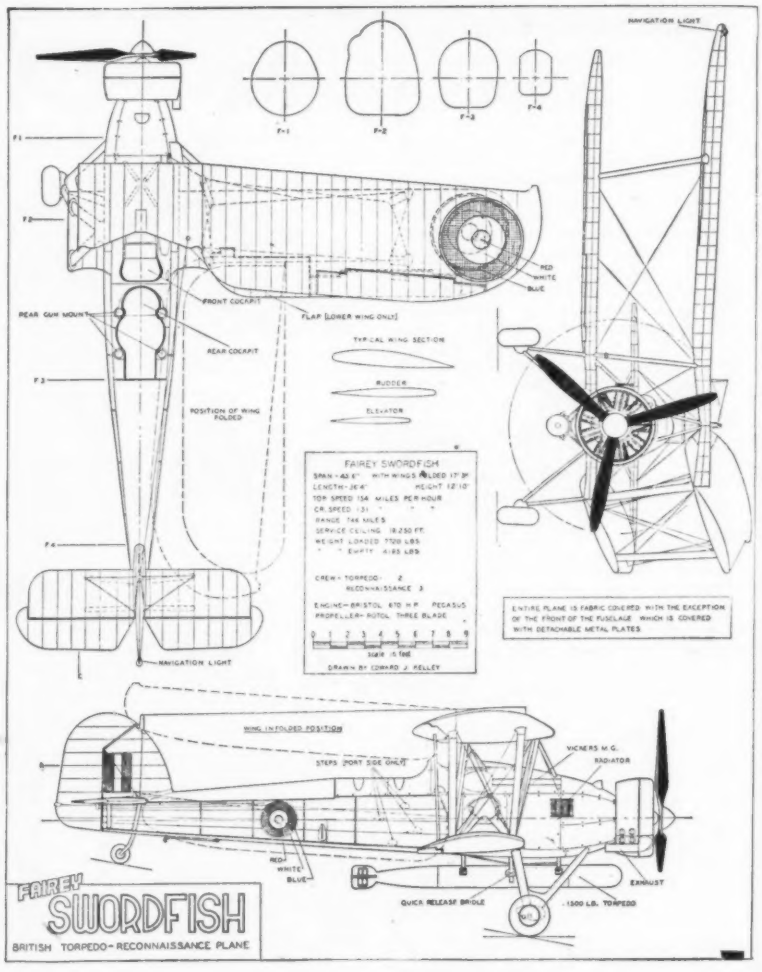
Air is taken in two ducts, one on either side of the lower fuselage just forward of the wing. Each duct is divided into two parts, the inboard section permitting the boundary layer of air to continue aft and spill into the free stream as interruption of this layer introduces large drag increments. The larger ducts spill into the main pressure chamber within the fuselage. The impeller of the jet engine draws this freely circulating air into compression for delivery to the combustion chambers, of which there are nine. Combustion heats and expands this air (now a vapor by reason of fuel by-products) and the resultant pressure is impinged against the turbine wheel, which drives the impeller. The reaction caused by this pressure creates the force that drives the P-80 forward. The gases are then exhausted from the rear of the plane. From the intake, at which point free stream air may be at a temperature of -50°, to the exhaust where the gases may be heated to temperatures in excess of 1500°, is a tortuous route of compression, vaporization, combustion and expansion of air, the basic medium of power for jet propulsion.

The jet engine requires no warm-up prior to take off and the plane is racing down the runaway 60 seconds after the engine is started. The faster the plane moves the greater the power developed by the jet. In addition, the higher the plane climbs (or the lower the temperature becomes) the faster it flies. These features of the jet principle make its use ideal in interceptor designs.

The jet engine does not develop "horsepower" in the conventional meaning of the term (550 ft.-lbs. per minute). Its output is rated in terms of "pounds of thrust" and this depends on a number of conditions (one pound of thrust is equal to one hp at 375 mph.) For instance, there is no thrust when speed of the jet and speed of the plane are the same. Only when the jet efflux (rearward) is faster than the speed of the plane (forward) does the unit develop thrust. Thrust is also increased by a greater mass flow of air. For a given efflux speed, the "heavier" the exhaust gases the greater the thrust. Thus kerosene is used rather than high octane gasoline because of its greater weight of burned vapor. High octane, of course, will work satisfactorily in the P-80 and can be used whenever local conditions of supply warrant it.

The only engine control is the throttle (compared to the throttle-mixture-propeller combination on the conventional fighter) and the turbine tachometer provides a close indication of the thrust output of the engine.

Structure of the *Shooting Star* is made up of four major assemblies: nose section, wing, a center fuselage section, an aft fuselage section and the empennage. The nose section is located forward of the cockpit and contains the armament and landing light assemblies. Armament comprises six .50 cal. machine guns mounted internally with their muzzles protruding through small, faired openings. The ammunition boxes are mounted above the guns and both boxes and guns may be completely removed from the plane in less than 15 minutes. The entire nose may be removed by quick-acting tension fittings and a new assembly installed in a matter of only a few minutes. This section also contains the oxygen and radio equipment. The landing light, located in the extreme nose, is adjustable for individual pilot preference.



The center fuselage section contains the cockpit and powerplant compartment. It is built up on a series of circular frames with solid bulkheads located fore and aft of the pilot. The cockpit is completely pressurized, first U. S. production fighter to claim this feature. Pressure is provided by the impeller unit of the jet engine. It is heated and ventilated by automatic control. Pressure in the cockpit is automatically reduced when the pilot's combat gun switch is turned on. This prevents physical injury in combat caused by an enemy bullet piercing the cockpit and suddenly releasing the pressure. The cockpit is lighted by fluorescent lamps mounted on either side. The pilot is protected by a heavy bullet proof glass windshield panel. Armor plate is mounted on upper forward side of the front bulkhead, aft of the front bulkhead, and a large panel immediately aft of the cockpit protruding up into the enclosure.

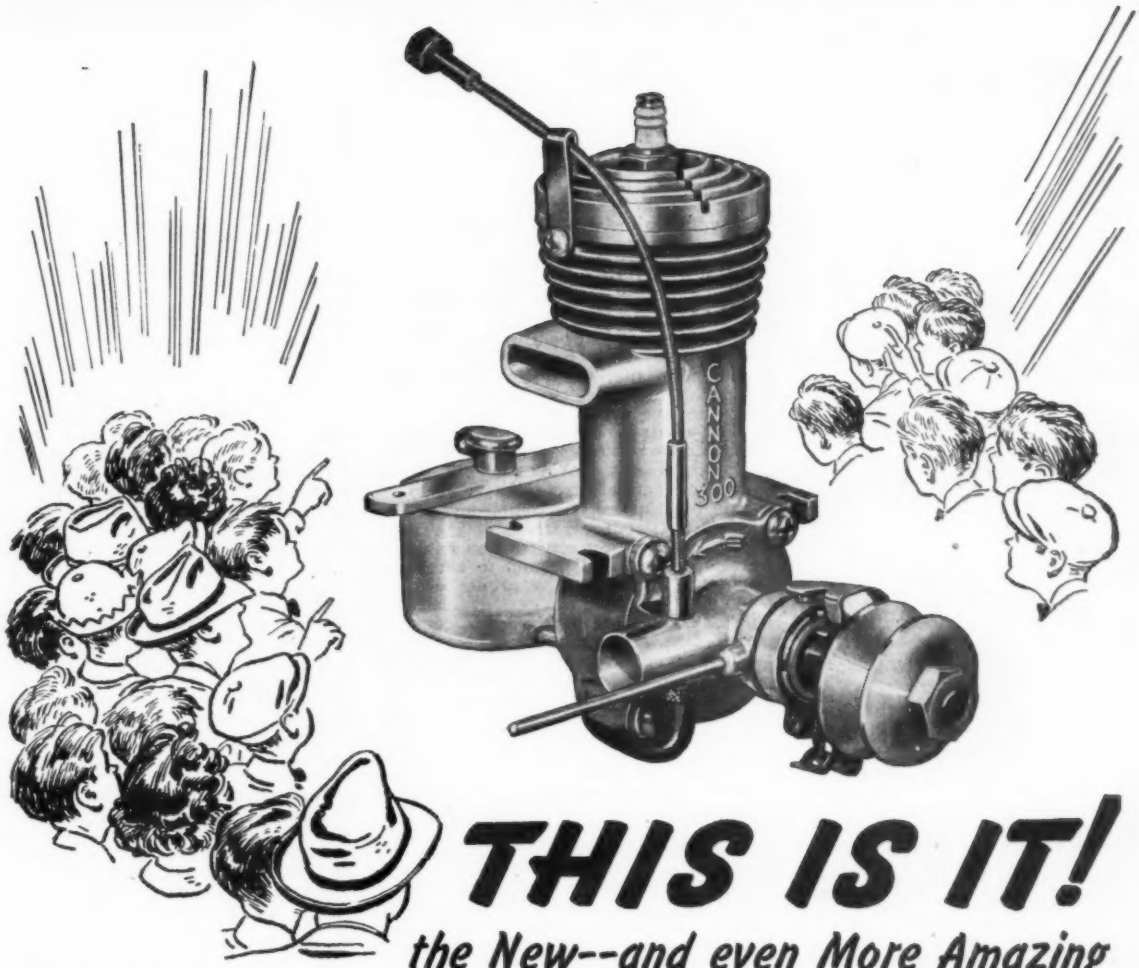
The fuel tank is located aft of the pilot but its capacity is a closely guarded secret as the range of the *Shooting Star* is one of its major advances over earlier types, both Allied and German designs. Space beneath the cockpit floor contains additional radio equipment as well as hydraulic and fuel lines and valves. The G-E super jet unit is mounted in aft end of the center fuselage section. The aft fuselage section is attached by quick-acting tension fittings. These permit removal of this section for access to the jet engine. The engine may be tested on the ground with the tail unit removed and rapid examinations and adjustments made between runs.

The aft fuselage section contains the nozzle duct and acts as a mount for the empennage. The latter, of full cantilever all-metal construction, are of extremely thin cross section, almost of knife-blade thickness.

The wing is built in one large assembly and attached to the main fuselage section by special fittings. An entirely new NACA laminar flow profile is used. The ailerons are of conventional design and all-metal construction. Additional fuel is carried in internal wing fuel cells and in auxiliary fuel tanks at the extreme tips. The location of these tanks, more than any other single consideration, gives the P-80 its peculiar appearance. The reason for this location is quite simple. During the wind tunnel test stage, the tanks were tried in every conceivable position from the wing root all along the span out to the tip, and finally at the tips themselves. Examination of data revealed that this latter location produced the least drag, so there they stayed—as simple as that! Lockheed engineers, however, do point out that this location breaks up critical airflow patterns around the wing tips thereby reducing vortices and delaying compressibility to an extent.

Flaps are of conventional design. Early in the design, however, it was realized that the absence of a propeller (which

(*Turn to page* 78)



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CANNON

The motor that led the field when war stopped production

affords considerable drag during a landing approach when the conventional engine is idling) would make necessary additional flap area. To solve this problem, "fuselage flaps" were installed (common in large transport design but very uncommon on pursuit plane designs where the fuselage normally extends below the wing). A unique system is used in which the fuselage flaps may be used in conjunction with the wing flaps or separately, according to the will of the pilot.

The ailerons are equipped with hydraulic booster units in which a slight effort of the pilot operates a hydraulic control unit, which in turn does the "work" of operating the ailerons against the heavy wind loads encountered in high speed maneuvers. So successful is this installation that tests have proved the *Shooting Star* the "quickest rolling" of any airplane ever built.

For all its high speed, stall characteristics of the plane are conventional. Due to its high wing loading it is difficult to spin and normally recovers in ¼ to ½ turn, truly a design accomplishment.

One outstanding feature of the P-80 is its finish. In the construction stage the rivets are cut and ground to a smooth surface. Zinc chromate primer coat is applied. All joints are cement filled and flexible joints are covered with organdy mesh tape. Over the primer coat a special surfacer is applied. The entire plane is then moved into a huge oven and the paint applied. It is then baked into the surface. Following removal from the oven, the entire surface is given a light sanding and a thorough buffing job. A specially developed wax coating is then sprayed on and polished to an unbelievably smooth gloss. It is this finish that exacts the last possible ounce of speed out of the potentialities of the basic design.

The *Shooting Star* has a span of 38' x 10½" and is 34' 6" long. It stands 11' 4" high, weighs approximately 8000 lbs. empty and has a gross weight (including maximum fuel load) of 14,000 lbs. Regarding its speed the AAF releases only the fact that it is capable of "more than" 550 mph. They are equally vague regarding its ceiling, admitting this to be "more than" 45,000 feet.

The story of the birth of the *Shooting Star* is one of the most exciting tales of modern aircraft engineering. It is almost the sole work of Clarence L. "Kelly" Johnson, Lockheed's Chief Research Engineer. Johnson originally gave preliminary thought to a jet-propelled airplane as early as the spring of 1941 and submitted designs to Wright Field. With war clouds gathering, however, the War Department vetoed the idea in favor of Lockheed's concentration of P-38 *Lightning* production and development. Johnson resumed his work on the P-38, producing new and improved models at frequent intervals. It was while observing the tests on one of these new models at Eglin Field, Florida, on June 17, 1943, that he met Colonel M. S. Roth of the Materiel Division of the AAF. Roth gave Johnson the news of the successful Bell P-59 *Airacomet* tests but explained it was only a little faster than conventional types. Roth expressed interest in an entirely new design and asked Johnson to try his hand at it.

En route back to Burbank, Johnson began making sketches. A week later he was at Wright Field with preliminary sketches and in a single day obtained the necessary "letter of intent" from the AAF, giving him the "go ahead" sign with one proviso: the completed plane must be ready in 180 days! Back home, Johnson conferred with Hall L. Hibbard, Lockheed vice-president in charge of engineering, who gave him a free hand in the project. Johnson selected E. D. Palmer, engineering special projects, and W. P. Ralston, project engineer to handle the engineering and design work. A. M. Viereck, experimental engineering manager and L. F. Holt, assistant, were chosen to handle construction of the first experimental plane. In the next few weeks Johnson assembled a hand-picked team of 23 engineers and 105 shop men, erected a temporary building of old engine boxes and canvas covering, posted a heavy guard and went to work on one of the most secret projects of the war. All red-tape was slashed, the bars were let down and no holds were barred in this race against time.

The wooden mock-up was completed on the 19th day. The British jet engine (used in the original experimental model) arrived on the 132nd day. On the 139th day the engine was started and on the 143rd the airplane was accepted by the Army and pronounced ready for flight tests!

Only 700 drawings were needed and a subsequent cost examination revealed the cost of the P-80 was only 63% of that of the first Lockheed XP-38 *Lightning*.

The Lockheed P-80 *Shooting Star*, miracle plane though it appears, is but the first vague rumblings of a revolution in aircraft, warfare, world politics and economics. Johnson and Hibbard have hinted at far greater and more astounding miracles now under development at Burbank. Jet and rocket propulsion, coupled with the atomic bomb, all wrapped up in a guided missile—that is the picture of the world tomorrow. It may be literally true that warfare will reduce itself to one simple fact—in the words of General Arnold: "Just send me the name and address", and tomorrow's weapons will do the rest.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF MARCH 3, 1933

Of MODEL AIRPLANE NEWS published monthly at Mount Morris, Ill., for Oct. 1, 1945.

State of New York } ss.
County of New York }

Before me, a Notary Public, in and for the State and county aforesaid, personally appeared Jay P. Cleveland, who having been duly sworn according to law, deposes and says that he is the Business Manager of the MODEL AIRPLANE NEWS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, George C. Johnson, 551 Fifth Ave., New York 17, N.Y.; Editor, Howard C. McKinlee, 551 Fifth Ave., New York 17, N.Y.; Managing Editor, Joseph M. Mann, 551 Fifth Ave., New York 17, N.Y.; Business Manager, Jay P. Cleveland, 551 Fifth Ave., New York 17, N.Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Air Age Inc., 551 Fifth Ave., New York 17, N.Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

JAY P. CLEVELAND, Business Manager.

Sworn to and subscribed before me this 25th day of September, 1945.

AVIS M. HOFFMAN, Notary Public.

[Seal] (My commission expires March 30, 1947.

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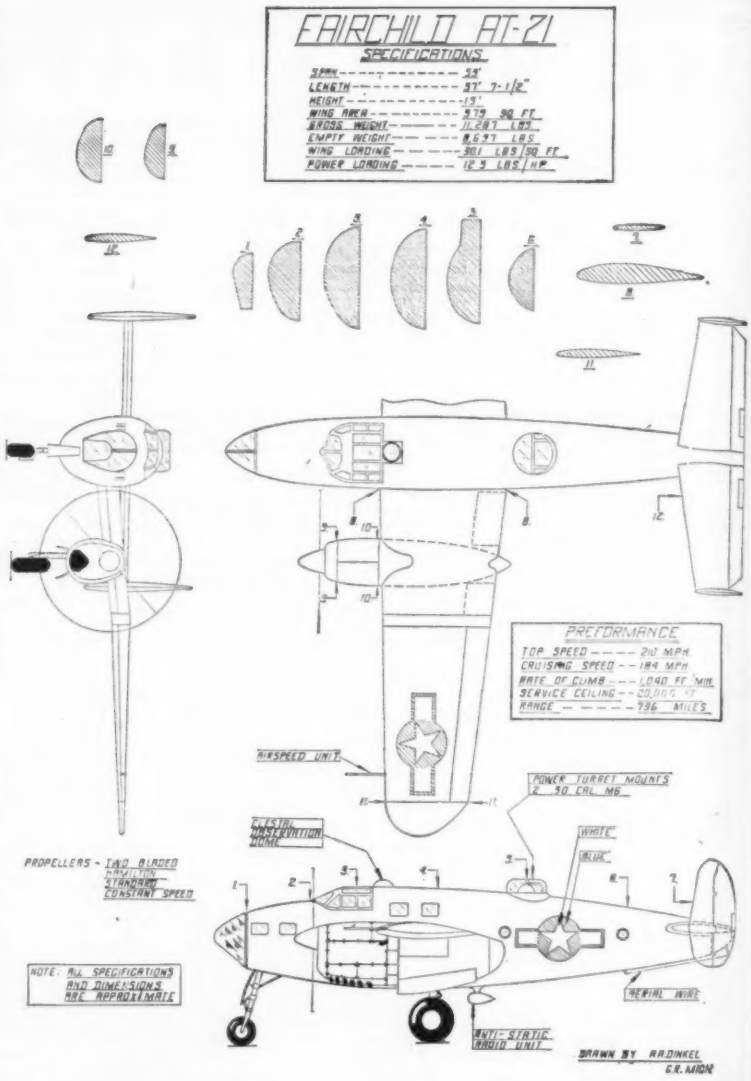


Senior Class D Stick Model

(Continued from page 23)

the notches for the spars and lay them in the notches to see that they fit snugly before taking the pins out of the ribs. This insures duplication of the ribs and alignment of the notches. Next cut the trailing edge out of a piece of 3/16" x 1/2" balsa and sand so the crossection is triangular thus fitting into the airfoil. Place the trailing edge on the plans and mark where the ribs meet it. At each intersection cut a 1/16" deep notch so the ribs will fit in. Cut the tips out of 1/8" sheet and sand their edges. When all these pieces are cut out the wing is ready for assembly.

The wing is built in two halves. Each half is cracked separately to give the wing its polydihedral. Start the assembly by pinning the trailing edge in place over the plans. Then glue each rib in its place and add the main spar and leading edge. Both should fit in snugly but easily if a good job has been done in notching the ribs. While they are drying, glue in the tips. The bottom spar is not put in place until the wing has been removed from the workboard.

When each half has been made it is cracked at the tip-dihedral joint, the tips raise 1-1/4" and hard balsa gussets put in. When both halves are completed, glue them together so there is a total of 5" dihedral under each tip, and put in gussets. (See diagram for detail of gussets.) A piece of 1/8" x 1/4" is glued along the central ribs to act as a support where the leading edge of the wing rests on the wing rails. This not only keeps the rails from pushing through the paper, but it acts as a brace for the incidence blocks. The wing is ready for covering after the rough spots have been sanded.

TAIL—The stabilizer is made in the same manner as the wing, except there are no dihedral joints. The airfoil is a Clark Y, and ten ribs cut from 1/16" sheet are required. The center section is filled in completely with 1/16" sheet for extra strength and to act as a rest on the body. The rudders are also cut from 1/16" sheet to the shape shown on the plans. As no 4" wide balsa is usually available, it must be made by glueing two 2" wide pieces together. On the left rudder, cut out a tab and sew on a piece of sheet metal to act as a bendable hinge. When the stabilizer is covered glue two pieces of wood, called keys, to the under part of the center section. These fit into the stabilizer mount on the body and prevent the stabilizer from turning or becoming unsteady.

PROPELLER—The last but most important item is the propeller which determines whether the model will climb like a skyrocket or mope around without gaining any altitude. Many kinds of folding devices are used on propellers. The type shown has been used by members of the *Richmond Model Flying Club* for over 3 years and the results have always been excellent. Instead of the usual type folding prop which places the hinge on the hub, this type puts the hinge mechanism right on the blade itself. In carving the first type it is necessary to make an oversized hub, but in making the blade-type folder no alterations need be made.

The first step in making the prop is to cut a block 2" x 2" x 8-1/2", into the pattern shown on the plans. Find the point 1/2" from the end of the hub in the middle of the block and drill the hole for the shaft. Make sure it is perpendicular to the block or the prop will be out of bal-

ance and vibrate in flight. Now carve the underside of the blade flat, make a mark on it 1/3 the way back from the leading edge and cut a long channel on this line 1/8" to 3/16" deep. Round off the undercamber and sand it until all knife marks are eradicated. Carve the top side of the blade so the blade is 1/4" thick at the hub tapering to 3/32" thick at the tip. Finish the carving by bringing the blade to the airfoil section shown on the plans. Sand the blade and it is ready for a hinge.

Cut the hinge to the pattern on the plans. It can be made out of any reasonably strong metal available, tin can material working as well as anything. Bend the end of the metal around a piece of .049" wire and solder the side of the tube thus formed. Drill a hole through the metal for the shaft and three more holes near the end so that the hinge can be sewn on the prop. Bend the other part of the hinge out of .049" wire and it is ready for the next step, which is glueing and sewing it to the prop. When this has been done, coat it with glue to give it extra strength.

There are two possible courses to follow in putting a finish on the prop. (1) Complete it like a hand launched glider with successive coats of wood-filler and dope. (2) Cover the prop with Silkspan and then dope it. If this method is used be sure and wet the Silkspan before applying. Apply glue to the blade and pull the wet Silkspan to the curve of the prop. The Silkspan strengthens the blade and keeps it from splitting in bad crack-ups.

Cut the bearing to shape shown on Plate 3 of the plans and glue to the front of the prop. Bend a piece of 1/16" wire into a counterweight support and sew it to the hub. Add weight to the wire so the prop is perfectly balanced. This weight can be solder, lead or a screw. The last step is to cut the blade at the hinge joint as shown by dotted lines on the plans.

Carve a noseblock out of medium weight balsa and put in the bearings. Bend the shaft out of 1/16" steel wire, putting a ball bearing washer and a spring between prop and noseblock. It is suggested that a bobbin be used, but the shaft may be covered with rubber tubing instead if desired. Put a wood screw in back of the noseblock to act as a "prop-stop." This serves to stop the propeller in its correct folding position after the power has run out. When the rubber is wound it pulls the shaft back so the stop is disengaged. When the power runs out, the spring pulls the prop out and engages the stop. This also keeps the last few winds in the rubber and prevents it from sliding back and forth and changing the balance of the plane while it is in flight.

COVERING—The original model was covered entirely with gas model Silkspan. Weight may be cut down by using rubber Silkspan instead but it has been found that gas Silkspan almost entirely prevents holes in the covering produced by landing in trees and brambles. When the plane is covered, spray the covering with water and give it two or three coats of dope.

Color combination of the original model was blue and white. It would probably be a good idea to change this to red and yellow or some other combination visible from a distance. This will enable the model to remain longer within the timer's sight-range and therefore have a better chance of winning contests. One advantage of the white, however, is that it sometimes reflects the rays of the sun better than other colors. On its record

flight, all the timer could see for the last few minutes was the flash of the sun's reflection as the plane banked while circling in the distance.

ASSEMBLY AND FLYING—Glue the wing rails, which are 1/8" sheet, to the top of the body. See that the noseblock fits snugly. Drill a hole in the nose panel that is filled in with sheet balsa and thread through a piece of rubber. This rubber holds on the noseblock and makes it easy to remove when winding.

Coil the motor, which consists of 22 strands of 3/16" rubber 30" long. The easiest method of doing this is to put two pins in the workbench 30" apart and wrap the rubber around it. Lube the rubber with castor oil or some prepared lubricant. The power may seem excessive but the rubber used was not as powerful as it was before the war.

All parts are strapped together with rubber. Before attempting any flights check the model to see that it is in alignment. There should be no warps in either the wing or tail. The stabilizer has no incidence but the wing has 3/16". The wing is placed so the trailing edge is over the center of gravity. The prop has 2° downthrust and 2° right thrust. These adjustments are approximate and will vary slightly in the individual model.

The first step in flying is to test glide. Bend the rudder tab to the left slightly so the plane will have a circle of about 100 yards in diameter in the glide.

When a smooth glide is obtained, put in about 75 winds and launch it into the wind. It should climb in a gentle right circle. If it does not, put in right thrust until it does. And downthrust if the model stalls. Gradually increase the number of winds on each flight until the

The Rubber Flying Scale Model in January 1946 issue of MODEL AIRPLANE NEWS will be the famous World War I Sopwith Camel by Joseph Wherry.

plane is flying under full power. Use a winder to do this. Stretch the rubber to five times its normal length before winding. Put in half the desired number of winds while the rubber is stretched, and the other half while slowly walking towards the model. The most that this motor will take is 720 winds, but don't put in this many unless it is a very important contest. Three-quarters of this number of winds is enough for ordinary flying. With this number the model should climb like a rocket for about 30 sec., spiralling up to the right, and should be about 300 ft. up by the time the prop folds.

If the plane is unstable, it is probably because the wing or tail is warped. One way of removing small warps is to dope the surface and hold it in correct position while the dope dries. If you have done a good job you will get many hours of flying fun from this model. But here is a warning! If you are not a good runner and can't trot a mile or two without collapsing, you had better get a bike or a car to go after it, for you will certainly need it!

LIST OF MATERIALS

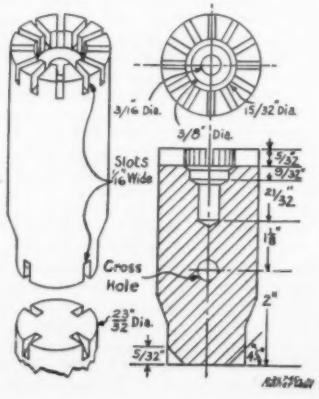
14—1/8" square x 36" Hard balsa
2—1/8" x 1/2" x 36" Hard balsa
2—1/8" x 1/4" x 36" Hard balsa
1—1/8" x 2" x 36" Medium balsa
2—1/16" x 2" x 36" Medium balsa
1—1" x 1-1/4" x 1-3/4" Medium balsa
1—2" x 2" x 8-1/2" Medium-hard balsa
55 feet 3/16" wide rubber
2 sheets gas model Silkspan
1/16" steel wire 16" long
Sheet metal for fittings
1 bobbin
Glue and dope

CYLINDER AND CRANKCASE WRENCH FOR ATOMS

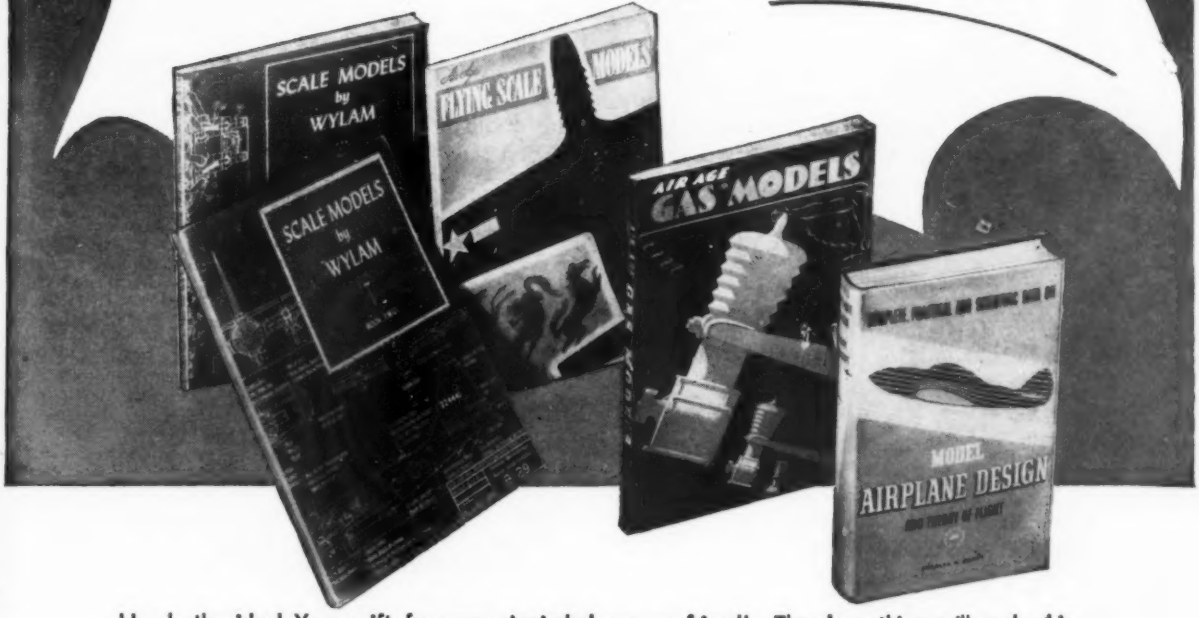
by RAY RUSHER

THE problem of removing and replacing the cylinder and crankcase of an *Atom* engine without damage is nicely solved by the simple wrench shown. It can be made from hardwood (a broomstick is suitable). It has four notches cut in the small end to engage the four ribs on the crankcase cover. Six radial saw slots cut in the large end are for engaging the twelve cylinder head fins. The center of the large end may be counterbored to clear the sparkplug. The cross-sectional view is full size with only the critical dimensions given.

The diameter of the wrench is such that the crankcase cover and the cylinder are not tightened too much when the wrench is turned by hand-grip alone. A spike can be inserted in the cross hole to aid in loosening them when they are found to be extra tight, but should not be used for tightening.



5 BOOKS THAT WILL DELIGHT ANY MODELER AT *Christmas*



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Model Airplane Activity In Holland During the War

by J. BIERENS

IN THIS article I will clarify events that occurred during the five years of German occupation. Many of my readers will be rather astonished to hear that during those terrible years there was model activity. However I can assure you that the Nazi gangsters, and their friends in Holland, members of the N.S.B., never succeeded in breaking our spirit of resistance. I don't think many of you have the slightest idea what a continuous fear for the unknown means; but still, during those five years we continued building model aircraft and flying them; often in lonely places.

Model activity in Holland began before the first World War, but the planes consisted mainly of steel wire and silk covering. All were rubber powered. However, during that war the sport died down and it wasn't until 1930 that activity again started, when a few boys began to build model sailplanes—built from German plans. In 1932 the first rubber powered models built were mostly copies of English and American models. By 1934 all model builders were united in clubs, and these clubs incorporated in the Royal Aero Club of Holland, (Kon. Ned. Ver. voor Luchtvaart) as a subdivision. Until the present, except for a few minor changes, this state of affairs remains unchanged.

Model building steadily increased from 1934 and in 1937 we sent a team abroad for the first time, to the Wakefields. Although we did not reach flights of record duration, our boys learned a great deal from their foreign friends. In 1938 we sent a Wakefield team to France, but this time also the results were not encouraging. In the same year we sent a team to Belgium, too, to a model glider event, and here we fared more successfully for we came out second. In 1939 we could not send a Wakefield team to America, but we sent a team to England to compete for the King Peter cup, and in this contest we won fifth place. In 1940 Germany invaded Holland and then the misery began.

Immediately after the occupation all seemed to be very difficult, but within a few weeks everything seemed to go on as usual. The Germans, as yet, did not interfere with us—and so in 1940 we held our big airplane contests which can be compared to those of your country. The clubs chose their teams in early spring, each consisting of from 3 to 6 boys. These teams competed against each other and the winners were sent to the final contest. The final winner is champion, and the boy who makes the highest average time is proclaimed individual champion.

In 1940 the first gas models appeared. Before then there were none, or comparatively few. It was often said abroad that Holland did not allow gas model flying, but it was never prohibited by the government. Suddenly, great interest was shown in gas models and the first contest was held in August 1940. In 1941 material, especially rubber, was becoming scarce, and so a new formula was created for rubber models, namely, the rubber weight which was not to exceed 45 grams. This formula worked well during 1941 and 1942.

In the meantime however a great many

(*Turn to page* 88)

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¼ sq. 3 25c
¼x⅜ 2 25c
⅜ sq. .....ea. 15c
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5 ft. sheets 2" wide, cost 6x16¢; Double cost for 3"

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36" cost twice; 6 ft. cost 3 times

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2x2x1 .....2c
2x2½x1 .....3c
3x3x1 .....4c
3x3x2 .....8c
2x2x6 .....10c
3x3x3 .....10c
6x8x2 .....17c

PROPELLERS

Balsa Rubber Powered	Flo-Torque Gas Model Var-nish	PLASTIC 2 bl.	3 bl.	4 bl.
5"	4c x x	1½"	2c	10c 10c
6"	5c x x	2"	2c	x 15c
7"	6c x x	2½"	3c	15c x
8"	7c x x	3"	5c	15c 20c
9"	8c 25c 50c	3½"	10c	20c x
10"	9c 25c 50c	4"	15c	30c 30c
11"	x 25c 50c	5"	20c	50c x
12"	10c 25c 50c			
13"	x 25c 50c			
14"	12c 25c 50c			
15"	15c x x			
16"	16c x x			
18"	25c x x			

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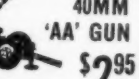

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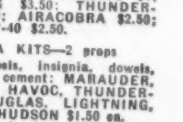

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1/16"x12" 6-5c
⅛"x18" ....3 or 5c
3/16"x18" ....ea. 4c
¼"x18" ....each 5c

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⅜" 5c; 1¼" ..10c
2" 15c

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⅜" 5c; 1¼" ..10c
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.014 .....3 ft. 2c
.020 .028....3 ft. 3c
.034 .040....3 ft. 4c
.049 .....3 ft. 5c
1/16" .....3 ft. 7c
3/32" .....3 ft. 10c
⅛" .....3 ft. 15c

TIMERS

Hilerest $1.25
Austin 1.50

SKYWAY MODEL AIRCRAFT SUPPLY CO., 426 Sixth Ave., Brooklyn 15, N. Y.

sailplanes were being built, but materials for this type of plane also became scarce and in 1942 a substitute was found for balsa, the type of wood usually used. Plywood also being scarce, cardboard became the substitute.

In July 1942 the Germans tried to Nazify the Royal Aero Club. However, rather than continue under Nazi rule, the officials resigned and nearly all members quit too. When this happened a number of N.S.B. were appointed leaders of model activity in Holland. This of course marked the end of our official activity, but it still did not discourage us. In January 1943 some former members of the Royal Aero Club took the initiative and arranged a meeting with a number of well known builders. The meeting was successful—a new classification was worked out, called "Class 43" for rubber powered models. The rubber weight of these models must be exactly 30 grams, and the model must be capable of R.O.G. In July 1943 we held a contest with these models which was a complete success. There were 25 entrants and many of the flights lasted longer than 3 min.

In 1944 matters became worse. It was very difficult to prearrange meetings, but we held on and in various towns and cities little groups of builders still carried on and remained in close contact with one another. The success of this was clearly shown when in 1944 a contest was held in an isolated place. It was a gas model contest and the highest time was almost 12 minutes. Most of model motors were built at home because ready-made ones were unavailable; however some models performed better with the home-made motors. Today, therefore, most of the boys build their own engines since it is still impossible to import them.

Since it was extremely difficult to secure material through regular channels, most of it was stolen from the Germans. In the beginning most of our models were drawn from American designs but later we developed our own and they performed very well. We use balsa most of the time for our gas and rubber models. Our gliders, however, are built from spruce or plywood, silk or paper covered. During the first two years of the war we were still able to secure balsa because the Germans used this material for life jackets for their seamen. You can readily understand that we felt perfectly justified in helping ourselves to this material. At the present time however material is so scarce that we are unable to get any for model use.

In September 1944 we thought we'd again be able to fly; but we were wrong, and so most of our fuel, originally used for the models, was put to better use cooking meals. This was a very dark period for us indeed. In May 1945 we were liberated and since then model activity has again been going on. At first it seemed strange to be able to go about doing things we did before the occupation, but we got used to it quickly.

Of course, all Nazi gangsters who had crept into the Royal Aero Club were put out and imprisoned. The old "High-Command" has again taken over the old air-model bus! And on the driver's seat we again have J. Van Hattum; many former model-builders will remember him.

We have held a few contests for gliders and one for gas models. Rubber is still scarce so we are unable to fly rubber models more than once. We are working on a big contest scheme for 1946 and hope we may be able to arrange an international competitive meet in Holland and perhaps send a team abroad, too.

A super "G" Line Model of unusual perfection. The Baby "V" Shark has a wing spread of 20 inches and performs like a champion, with a speed of over 100 miles per hour. Constructed of balsa wood, hardwood, plywood . . with durable all-steel landing gear. The ideal model for the beginner.

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First in Control Line Flying

SCHULENBURG, TEXAS

Scrappy

(Continued from page 32)

bamboo the tail is made of 1/16" sq. balsa. Both elevator tips can be constructed simultaneously by bending a double width piece which is then split in two.

The wings are made in the conventional manner. Build the wing tips in duplicate similar to the tail. For greater simplicity, a flat bottom may be used on the airfoil.

After sanding them smooth, cover the parts. Glue the tail in place and dope the fuselage and tail. Now install the prop and motor and locate the center of gravity. The wings should be placed in the same position relative to the c.g. as shown in the plan. This makes it unnecessary to add weight for balance. Force the wing struts into the wood as was done with the landing gear struts. Now dope the wings and you are nearly finished. If you wish to have a better looking *Scrappy* add a celluloid windshield, a cockpit coaming of insulation stripped from wire, and control outlines of black paper. Of course the wheels, prop and struts should also be color-doped. With all these refinements your model will be quite realistic.

Now for some flights! Glide *Scrappy* and make any minor adjustments by warping the elevators. Any extreme tendency should be corrected by adding weight to the nose or tail, but do not do this unless necessary because any added weight cuts down flight time. When a good glide is obtained try some hand winds. Adjust for right circle in the climb and glide. Finally, use a winder and get ready for some real fun, but be sure to lube your motor to preserve both it and the model. Our models did 30-35 sec. on about 180 hand winds, and 1½ min. with 400 winder winds.

Flash News

(Continued from page 2)

has resulted in a plane with an almost constant power output up to the critical altitude.

Another advantage of the combination is the location of the thermal jet engine in the rear thus removing the c.g. further aft, thereby placing the wing aft and permitting installation of a nose wheel, the first of the type.

Outstanding feature of the *Fireball* is its extreme maneuverability, and it has the shortest turning radius at comparable speeds of any modern fighter. Top speed of the FR-1, with both engines operating, is still restricted information but it was revealed that a top speed of 320 mph on the front engine alone and a top speed of 300 mph on the jet engine alone can be effected.

Armament consists of four .50 caliber machine guns with 300 rounds for each weapon. Two 1,000 lb. bombs may be carried as well as rockets or auxiliary fuel tanks.

High spot of the show and one of the astounding possibilities of the type was a sweep across the field with the propeller feathered and the plane operating only on the jet. It is one of the strangest sights of modern aviation.

Production on the Ryan FR-1 *Fireball*, although heavily cut from earlier schedules is continuing, as is research on a later model.

STRANGEST OF THE new postwar transport planes is the Douglas DC-8

which can best be described by a name sure to stick: the *Mixmaster*. The 48 passenger low wing monoplane is powered by two 1600 hp Allison V-1710 engines driving counter-rotating propellers located in the extreme aft end of the fuselage. The DC-8 will have a span of 110 ft. 2 in. and be 77 ft. 10 in. long. Its maximum gross weight will be 39,500 lbs. and a maximum cruising speed of 270 mph is expected. Of equal interest was the simultaneous revelation of the Douglas XB-42 bomber, on the design of which the DC-8 is based. The bomber, however, is a shoulder wing design with the main gear retracting rearward and into the fuselage. The pilot and co-pilot are located in a special "bubble" canopy. The XB-42 is believed to be the fastest AAF bomber ever built with a top speed of 410 mph at 27,000 ft. making it our first bomber in the 400 mph class. It weighs 35,702 lbs. The *Mixmaster* design has been under development for more than four years and has been designed in numerous versions. The original commercial version was designed for 24 passengers and was known as the *Skybus*. Future plans for the DC-8 have not been revealed.

FIRST ROUND in the postwar transport fight would appear to be Lockheed's with the simultaneous announcement by three airlines that orders for a total of 79 *Constellation* transports had been signed. Largest order was for 36 by TWA, whose president Jack Frye and owner Howard Hughes laid out the original design. Pan American Airways announces orders for 23 of the giant planes and Eastern has ordered 20. The planes sell for about $835,000 each and will cruise at 300 mph. TWA announces that a 10-hr. coast-to-coast service will be in operation in a few weeks with the first 12 planes scheduled for delivery this year. TWA has had prior delivery rights since completion of the first plane delivered to the AAF as the C-69.

Later deliveries of the giant 51-passenger planes will be used on TWA trans-Atlantic routes recently awarded, and the New York-Europe flight time will be cut to less than 14 hours. Pan American announced its purchase to "bridge over" the expected 5 year gap before it can take delivery of giant 100 and 200 passenger liners now on order. The *Constellations* will be used on PAA's trans-Atlantic service, for Pacific service, Alaskan service and to South America. Of the total order, 21 will go into PAA service and the other two will go to Pan-American-Grace Airways for use over South and Central American routes. Eastern Airlines will use the *Constellation* to cut its flight time to such figures as: New York-Miami in 4½ hrs., New York-New Orleans in 4½ hrs., New York-Washington in less than 1 hour.

MOST RECENT NEW transport to reach the flight test stage is the giant Douglas DC-7, prototype of which was developed for the AAF as the XC-74. Powered by four 3000 hp. Pratt & Whitney *Wasp Major* engines, the giant will accommodate 108 passengers in the commercial version. However, the project came to a dismal halt in the following series of actions: V-J Day terminations of contracts struck orders for the C-74 from the AAF. It was on the basis of quantity production of the plane for the AAF that Douglas had signed a contract with Pan American for 26 of the DC-7 type at a cost of $40,000,000. Cancellation

of the AAF contracts resulted in Douglas' upping the price to Pan Am, which forthwith cancelled its contract. Result: no orders for the DC-7 as of this writing. Douglas' sales hinge largely on the DC-6, a "souped-up" version of the famed DC-4 *Skymaster* with Pratt & Whitney *Double Wasp* engines and an 88" increase in fuselage length.

THE LIFTING OF censorship revealed numerous new combat planes which were in various stages of completion when V-J Day rung down the curtain. The Goodyear F2G is a single-seat fighter powered by a Pratt & Whitney R-4360 *Wasp Major* developing 3,000 hp. It has a rate-of-climb half again as fast as the latest developed jet fighter, in the words of a company announcement. In production for some time it was due to go into action shortly. The B-35 is revealed as a Northrop flying wing design powered by four *Wasp Major* engines. It has a span of 178 ft. and is now nearing completion. The B-36 is a Consolidated design with a span of 230 ft. and a length of 183 ft. It will weigh 320,000 lbs. upon completion. It is powered by six *Wasp Major* engines. It will carry 19,000 gallons of fuel and have a range of 8000 miles. Official announcement of the Grumman F8F *Bearcat* single seat fighter arrived. It is powered by a *Double Wasp* engine and has flush-riveted R-301 skin.

HUGHES AIRCRAFT is completing the reconversion of several Douglas B-23 *Dragon* bombers of pre-war vintage. Five of the reconverted cargo-passenger version have been sold ($80,000) to the following: Hughes Tool Co., Gar Wood Industries, Henry J. Kaiser Co., United Drug Co. and General Motors Corp. Pan American has 6 of the craft used for survey and general cargo work. The *Dragon* is of the general DC-3 design.

REPUBLIC AIRCRAFT is engaged in converting Douglas C-54 *Skymaster* transports for the airlines.

CONFIRMATION of earlier reports is contained in the announcement by A. J. Weatherhead, Vice-Pres. of the Cleveland Chamber of Commerce, that the National Air Races will be held next summer. Conferences with General Eaker and Vice Admiral Mitscher regarding AAF and Naval Aviation participation have been held. At least one of the events will be for jet propelled aircraft. Oldtime Air Races attendants will anticipate this new event with misgivings. Don't look for "backyard" jaypee racers—turbines and compressors cost considerable money and are manufactured only by expert firms such as G-E and Westinghouse.

CURTISS-WRIGHT CORP. has announced plans to move all its activities from Buffalo, N.Y. to the firm's plant at Columbus, Ohio. This follows recent termination of C-W activities at St. Louis where their facilities have been occupied by MacDonnell for a vastly expanded Navy project. Abandonment of the Buffalo site ends 20 years of C-W business in that city and removes from the state of New York the oldest aircraft industry in the nation which was begun 40 years ago at Hammondsport by Glenn Curtiss.

AERONCA AIRCRAFT is now in quantity production on the first postwar personal aircraft, the *Champion*, two seat tandem monoplane. The craft sells for $2095, cruises at 90 mph and has a range of 270 miles. The side-by-side *Chief* will soon be available.

FIRST OF THE anticipated postwar airline mergers involves Mid-continent and American Airlines, accomplished through an exchange of stock. Others are rumored in the offing.

TRANSCONTINENTAL & WESTERN AIR announces plans to change its name to Trans-World Airlines, maintaining the famed TWA name but enlarging the connotation of the initials to encompass the world scope of the airline.

AUSTRALIA'S Prime Minister Chiefly proposed a Pacific exposition to be held in 1948 and to feature a London-Sydney and New York-Sydney air race.

ENGLAND IS NOT the only nation to convert combat bombers into transport planes. North American Aviation has just completed conversion of five B-25J *Mitchell* medium bombers into six passenger airliners for high ranking military personnel. The conversion requires the complete stripping of the military equipment of the airplane and installation of windows, sound-proofing and upholstery, seats, lavoratory, sleeping compartment and the location of all radio, heating and ventilating equipment in the nose. The 6-place version (with crew of 2) cruises at 265 mph for 2,000 miles at 10,000 ft.

MOSCOW RADIO reports that a rubber powered model remained aloft for 26 min. 41 sec. during which time it covered more than 4 miles and reached a height of 7,600 ft. The flight took place at Novosibirsk, Siberia.

BOX SCORE on the European Theater has been announced by the AAF and reveals that a total of 18,418 planes were lost in action with crew casualties of 38,185 airmen killed or missing.

THE LARGEST AIRFIELD in the entire world and the center of this nation's eastern air defense will be built at Andrews Army Air Base, Camp Springs, Md. The field is located 10 miles southeast of Washington, D.C. and covers 4700 acres of ground. It includes 15 miles of taxiways and has four 5500 ft. runways. When complete, the project will have cost $15,000,000 and will include 259 buildings. The field is named after the late Lt. Gen. Frank M. Andrews, former commander of the American Expeditionary Forces in the British Isles, who was killed in a crash in Iceland on May 3, 1943.

RUMORS PERSIST that the Curtiss XF15C-1 is a true rocket design and that it has passed the design stage.

ALTHOUGH A recent survey within the Army Air Forces revealed that 62,000 officers desired to remain in service, not ONE enlisted man (of those interviewed) expressed a desire to stay in! Some of the latter, however, indicated a willingness to stay in provided they could become regular AAF pilots. With an average of eight ground crewmen required for every combat airplane, size of the postwar Air Forces may be determined by availability of enlisted men!

SECRETARY OF THE NAVY Forrestal has asked Congress for an 8,000 plane Naval Aviation. He told the House Naval Affairs Committee that the postwar Navy should include 15 aircraft carriers (including 3 of the new 45,000 tonners) and 21 escort carriers.

HARRY HUME CROSBY, 37, noted racing and test pilot, was killed recently in the crash of a secret experimental Northrop plane at the Muroc Army test base in California. Crosby, formerly a transport captain with Consairway's trans-Pacific airline, was a familiar figure in the 1936-7-8 National Air Races with his tiny racing plane of his own design.

GLENN L. MARTIN CO. has completed preliminary flight tests on a special B-26 *Marauder* equipped with two landing wheels placed in tandem in the fuselage.

Small "out-rigger" retractable small wheels are contained in the engine nacelles. Purpose of the tests has not been revealed but Air Technical Service Command has conducted tests on the plane. Jet propelled planes will have extremely small nacelles, actually too small for conventional size main wheels.

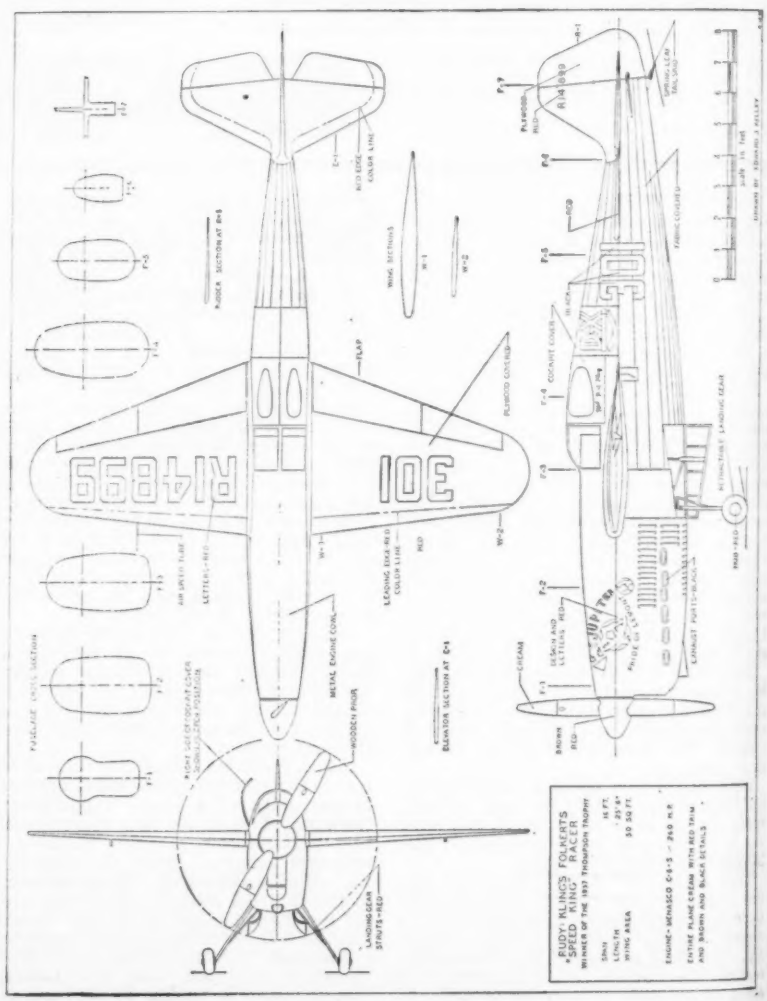
LATEST NORTHROP BLACK WIDOW is the P-61C, which features "picket fence" dive brakes and "high activity factor" propellers. The *Double Wasp* engines are of a more powerful model and the "C" is greatly improved in all-around performance. A new Northrop model is now undergoing flight tests and present contracts call for its production before the end of the year.

THE FIRST LOCKHEED P-38 *Lightning* has been sold to a civilian purchaser. He turned out to be not an ex-AAF "hot pilot" but greying 53 year old Arthur D. Knapp, President of Mechanical Products, Inc. of Jackson, Mich. Knapp has had 22 years private flying time and plans to use the *Lightning* (P-38J, latest model) for flying laboratory work testing his company's high pressure hydraulic and electrical equipment. He estimates that the plane costs $50 an hour to fly. Guards at the Troop Carrier Command's Stout Field, Ind., are said to have arrested Knapp when he stepped from his craft in civilian clothes and only after thorough proof of his odd purchase did they release him!

ONE OF the most sensational developments to come out of the war, and one rated among the highest in secrecy, is the "proximity fuze," a sort of ultra midget radar development. This fuze is fitted in the nose of a shell, usually of 5 inch size, and detonates the charge when the shell comes near enough to a target to cause damage. Called the "VT fuze" for short, this development consists of a complete 5 tube radio transmitter and receiver which sends out impulses when the shell is in flight. As soon as the shell nears a target the reflection of the transmitted impulses is picked up by the receiver and causes an electrical detonator to fire the charge.

The "VT fuze" was first used against V-1 bombs during the attack on London in 1944. When it is realized that anti-aircraft shells did not have to hit the buzz bombs but were set to explode whenever they came within 70 feet of the bomb, the effectiveness of the weapon can readily be understood. Thus, shells which would have missed the target completely were made to explode near enough to damage it with disastrous fragments.

The shell was again used with devastating effect against the Germans in the Belgian Bulge during the counter-offensive in the winter of 1944, and finally was the Navy's most effective weapon against the Jap suicide bombers toward the close of the Pacific campaign.



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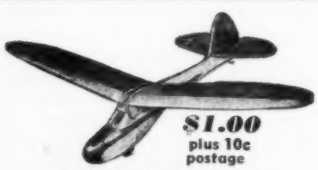

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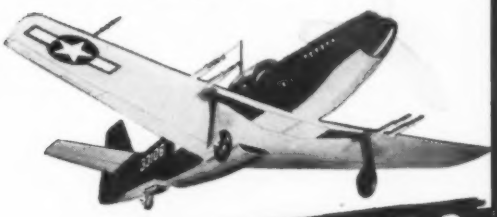

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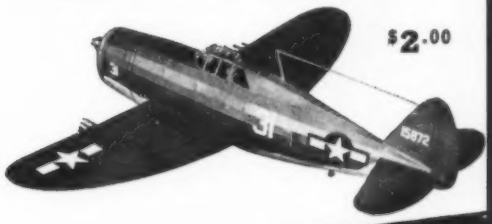

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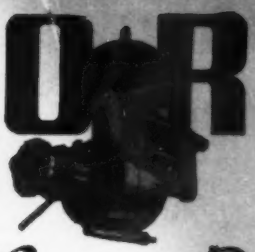

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